Dr. N.G.P.ARTS AND SCIENCE COLLEGE

REGULATIONS 2025-26 for Under Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

B.Sc. Biochemistry Degree

(For the students admitted during the academic year 2025-26)

Eligibility

A pass in Higher Secondary Examination conducted by the Government of Tamil Nadu with Physics/ Biology/ Chemistry /Biochemistry/ Microbiology/Home science as one of the paper are only eligible for Examinations accepted as equivalent there by Academic Council, subject to such conditions as may be prescribed there to are permitted to appear and qualify for the **Bachelor of Science in Biochemistry Degree Examination** of this College after the programme of study of three academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. Offer students a thorough understanding on basic principles of biochemistry at the molecular and cellular levels.
2. Empower students to comprehend the occurrence of varied bio- molecular types with unique chemical characteristics that make them indispensible for life.

3. Provide students a detailed understanding on basic energy requirement of living cells, and how cells meet this prerequisite adequately through varied metabolic processes.

4. Capacitate students to grasp intricate influence of DNA and RNA structures in preserving and transferring information of cell function for generations.

5. Enable students to understand how multiple biological reactions with differing kinetics are performed in a small cell volume at a given time.

6. Entitle students to appreciate the prominence of Biochemistry in basic and applied research in varied branches of industry, medicine, agriculture, pharmacy, food technology, biotechnology, etc.

PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	Graduates are cognizant of basic principles and concepts in diverse branches of biological and allied sciences that govern mechanisms of bio-molecular unity in varied life existences. Alumni are expressive of assimilated wisdom to peers and public at ease with language of their choice through discussion and debate.
PO2	Graduates are comprehensive of intricacies in biological organization, and they have acquired and developed primary and secondary experimental competencies and technical skills to address, investigate, design, develop and demonstrate solutions to life's important issues.
PO3	Graduates are advantaged to the pivotal and functional importance of major and allied subjects, and combine it with modern tools to investigate both basic and applied research questions in areas of industry, medicine, agriculture, pharmacy, food technology, biotechnology, etc. Alumni are valuable performers as an individual or in a team.
PO4	Graduates are competent to enroll in higher education programs, and successful in placements of vast career options in core and allied areas of the study (scholars, managers, counselors, writers, technical experts, field experts, teachers, entrepreneur and a responsible citizen). Alumni have acquired and developed skills to manage projects and finances. While discharging duties at varied capacities, graduates are inculcated to keep sustainable environment as a goal, and follow ethics of professional stature.
PO5	Graduates are infused with metamorphic qualities of education, and inspired to develop scientific temperament and lead a scientific way of life in facing socio-economical challenges that will benefit the society. Alumni are adept at connecting their learning's to worldwide events. Thereby, they continue the learning's lifelong.

TOTAL CREDIT DISTRIBUTION

Part	Subjects	No.of Papers	Credit	SemesterNo.
I	Tamil/Hindi/French/Malayalam	4	4x3=12	I,II,III&IV
II	English	4	4x3=12	I,II,III&IV
III	Core Credits (5)	3	5X 3=15	I-VI
	Core Credits (4)	9	4X 9=36	I-VI
	Core Credits (3)	1	3X1=03	I-VI
	Core Practical (2)	7	2X7=14	I-VI
	Core Project (2)	1	2X1=2	VI
	Inter Departmental Course(IDC)	2	3X2=6	I-II
	Inter Departmental Course(IDC)	2	4X2=8	III & IV
	Inter Departmental Course Practical (IDC)	1	2X1=2	I
	Discipline Specific Elective(DSE)	3	4X3=12	V & VI
	Skill Enhancement Course(SEC)	4	2X4=8	III -VI
	Industrial Training	1	2X1=2	V
IV	Environmental Studies(AECC)	1	2X1=2	I
	Basic Tamil/ Advanced Tamil/ Human Rights and Womens rights	1	2X1=2	II
	Generic Elective (GE)	1	2X1=2	V
	Innovation, IPR and Entrepreneurship	1	2X1=2	VI
V	NSS/NCC/YRC/RRC/Yoga/ Sports/Clubs	1	2X1=2	II
Total credits			142	

CURRICULUM

B.Sc BIOCHEMISTRY PROGRAMME

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
First Semester Part-I												
25TLU1TA	Language-I	Tamil-I	4	1	-	5	60	3	25	75	100	3
25TLU1HA		Hindi-I				5	60					
25TLU1MA		Malayalam-I				5	60					
25TLU1FA		French–I				5	60					
Part-II												
25ELU1EA	Language-II	English I	4	-	1	5	60	3	25	75	100	3
Part-III												
25BCU1CA	Core-I	Biomolecules	4	-	-	4	48	3	25	75	100	4
25BCU1CB	Core-II	Cell biology	3	-	-	3	36	3	25	75	100	3
25BCU1CP	Core Practical-I	Biomolecules and Cell Biology	-	-	4	4	48	6	40	60	100	2
25CEU1IA	IDC-I	Chemistry	3	-	-	3	36	3	25	75	100	3
25CEU1IP	IDC Practical-I	Chemistry	-	-	4	4	48	3	40	60	100	2
Part-IV												
25MBU1AA	AECC-I	Environmental studies	2	-	-	2	24	-	50	-	50	2
Part-V												
25BCU1XA	Extension Activity	NSS/NCC/YRC/ RRC/Yoga/ Sports/ Club	-	-	-	-	-	-	50	-	50	1
Total			**20**	**1**	**9**	**30**	**360**				**800**	**23**

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Second Semester												
Part-I												
25TLU2TA	Language-I	Tamil - II	4	1	-	5	60	3	25	75	100	3
25TLU2HA		Hindi-II				5	60					
25TLU2MA		Malayalam-II				5	60					
25TLU2FA		French–II				5	60					
Part–II												
25ELU2EA	Language-II	English - II	4	-	1	5	60	3	25	75	100	3
Part–III												
25BCU2CA	Core-III	Enzymology	5	-	-	5	60	3	25	75	100	4
25BCU2CB	Core-IV	Microbiology	4	-	-	4	48	3	25	75	100	4
25BCU2CP	Core Practical-II	Enzymology and Microbiology	-	-	4	4	48	6	40	60	100	2
25PYU2IB	IDC-II	Physics	3	-	2	5	60	3	25	75	100	3
Part-IV												
25TLU2AA/ 25TLU2AB/ 25CRU2AA	AECC-II	Basic Tamil/ Advanced Tamil /Human Rights and Women's Rights	2	-	-	2	24	-	50	-	50	2
Part V												
25BCU2XA	Extension Activity	NSS/NCC/ YRC/RRC/ Yoga/Sports/ Club/Health and Wellness	-	-	-	-	-		50	-	50	1
Total			**22**	**1**	**7**	**30**	**360**				**700**	**22**

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Third Semester												
Part-I												
25TLU3TA	Language-I	Tamil-III	3	1	-	4	48	3	25	75	100	3
25TLU3HA		Hindi-III				4	48					
25TLU3MA		Malayalam-III				4	48					
25TLU3FA		French–III				4	48					
Part–II												
25ELU3EA	Language-II	English-III	3	1	-	4	48	3	25	75	100	3
Part–III												
25BCU3CA	Core-V	Human Physiology	5	-	-	5	60	3	25	75	100	5
25BCU3CB	Core-VI	Developmental Biology	5	-	-	5	60	3	25	75	100	4
25BCU3CP	Core Practical-III	Human Physiology and Developmental Biology	-	-	4	4	48	6	40	60	100	2
25MTU3IF	IDC-III	Principles of Biostatistics	4	-	-	4	48	3	25	75	100	4
25BCU3SA	SEC-I	Analytical Biochemistry	2	-	2	4	48	3	25	75	100	2
Total			**22**	**2**	**6**	**30**	**360**				**700**	**23**

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Fourth Semester												
Part-I												
25TLU4TA	Language - I	Tamil-IV	3	1	-	4	48	3	25	75	100	3
25TLU4HA		Hindi-IV				4	48					
25TLU4MA		Malayalam-IV				4	48					
25TLU4FA		French–IV				4	48					
Part–II												
25ELU4EA	Language - II	English-IV	3	1	-	4	48	3	25	75	100	3
Part–III												
25BCU4CA	Core- VII	Intermediary Metabolism	5	-	-	5	60	3	25	75	100	5
25BCU4CB	Core- VIII	Nutritional Biochemistry	4	-	-	4	48	3	25	75	100	4
25BCU4CP	Core Practical-IV	Metabolism and Nutritional Biochemistry	-	-	4	4	48	6	40	60	100	2
25CSU4IM	IDC-IV	Python for Biologists	3	-	2	5	60	3	25	75	100	4
25BCU4SM	SEC-II	Bioinformatics	2	-	2	4	48	6	25	75	100	2
Total			**21**	**1**	**8**	**30**	**360**				**700**	**23**

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Fifth Semester												
Part–III												
25BCU5CA	Core- IX	Genetics and Molecular Biology	5	-	-	5	60	3	25	75	100	5
25BCU5CB	Core-X	Plant Biochemistry	4	-	-	4	48	3	25	75	100	4
25BCU5CC	Core-XI	Immunology	4	-	-	4	48	3	25	75	100	4
25BCU5CP	Core Practical -V	Plant Biochemistry	-	-	4	4	48	6	40	60	100	2
25BCU5CQ	Core Practical -VI	Immunology and Molecular Biology	-	-	4	4	48	6	40	60	100	2
25BCU5SA	SEC-III	Recombinant DNA Technology	3	-	-	3	36	3	25	75	100	2
25BCU5DA	DSE-I	Blood Biochemistry and Hematology	4	-	-	4	48	3	25	75	100	4
25BCU5DB		Environmental Biochemistry				4	48					
25BCU5DC		Dairy Biochemistry				4	48					
25BCU5TA	IT	Industrial Training	-	-	-	-	-	-	40	60	100	2
Part IV												
	GE-I		2	-	-	2	24	-	50	-	50	2
Total			**22**	**-**	**8**	**30**	**360**				**850**	**27**

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Sixth Semester												
Part–III												
25BCU6CA	Core-XII	Clinical Biochemistry	5	-	-	4	48	3	25	75	100	4
25BCU6CB	Core-XIII	Hormonal Biochemistry	4	-	-	4	48	3	25	75	100	4
25BCU6CV	Core	Core Project	-	-	4	4	48	3	40	60	100	2
25BCU6CP	Core Practical-VII	Clinical and Hormonal Biochemistry	-	-	4	4	48	6	40	60	100	2
25BCU6SA	SEC-IV	Molecular Diagnostics	3	-	-	4	48	3	25	75	100	2
25BCU6DA	DSE-II	Neuro Biochemistry	4	-	-	4	48	3	25	75	100	4
25BCU6DB		Marine Biochemistry				4	48					
25BCU6DC		Sports Biochemistry				4	48					
25BCU6DD	DSE-III	Pharmaceutical Biochemistry	4	-	-	4	48	3	25	75	100	4
25BCU6DE		Principles of Biotechnology				4	48					
25BCU6DF		Bioresources and Bioprospecting				4	48					
Part-IV												
25BCU6AA	AECC-III	Innovation, IPR & Entrepreneurship	2	-	-	2	24	-	50	-	50	2
Total			**22**	-	**08**	**30**	**360**	-	-	-	**750**	**24**
		Grand Total									**4500**	**142**

DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective courses during Semesters V & VI

Semester V (Elective I)

List of Elective Courses

S.No.	Course Code	Name of the Course
1.	25BCU5DA	Blood Biochemistry and Hematology
2.	25BCU5DB	Environmental Biochemistry
3.	25BCU5DC	Dairy Biochemistry

Semester VI (Elective II)

List of Elective Courses

S.No.	Course Code	Name of the Course
1.	25BCU6DA	Neuro Biochemistry
2.	25BCU6DB	Marine Biochemistry
3.	25BCU6DC	Sports Biochemistry

Semester VI (Elective III)

List of Elective Courses

S.No.	Course Code	Name of the Course
1.	25BCU6DD	Pharmaceutical Biochemistry
2.	25BCU6DE	Principles of Biotechnology
3.	25BCU6DF	Bioresources and Bioprospecting

GENERIC ELECTIVE COURSE (GE)

The following is the course offered under Generic Elective Course

Semester V

S.No.	Course Code	Course Name
1	25BCU5GA	Organic farming: principles and practices

EXTRACREDIT COURSES

The following are the courses offered under self-study to earn extra credits:

Semester III

S.No.	Course Code	Course Name
1	25BCUSSA	Herbal technology
2	25BCUSSB	Bioentrepreneurship

Semester – I LANGUAGE – I: TAMIL - I							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	25TLU1TA	TAMIL - I	LANGUAGE- I	48	12	-	3

Preamble	மொழிப்பாடங்களின் வாயிலாக தமிழரின் பண்பாடுநாகரீகம், பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்
	கலை மற்றும் மரபுகளை அறியச் செய்தல்
	மாணவர்களின் படைப்பாக்கத்திறன்களை ஊக்குவித்தல்
Prerequisite	தமிழ் மொழி எழுதி, படிக்கும் திறன்

Course Outcomes (Cos)		
CO. No.	**Course Outcomes (COs) Statement**	**Bloom's Tax anomy Knowledge Level**
CO1	வாழ்க்கைத்திறன்கள் (Life Skills)- மாணவர்களின் செயலாக்கத்திறனை ஊக்குவித்தல்	K2
CO2	மதிப்புக்கல்வி (Attitude and Value education)	K3
CO3	பாடஇணைச்செயல்பாடுகள் (Co-curricular activities)	K3
CO4	சூழலியல் ஆக்கம் (Ecology)	K4
CO5	மொழி அறிவு (Tamil knowledge)	K4

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

25TLU1TA	TAMIL - I

Syllabus

Unit	Content	Hrs	Resources
1	**மறுமலர்ச்சிக் கவிதைகள்** 1. இலக்கிய வரலாறு -மறுமலர்ச்சிக் கவிஞர்களின் தமிழ்ப்பணிகள் 2. பாரததேசம்- பாரதியார் 3. படி - பாரதிதாசன் 4. தமிழரின் பெருமை- நாமக்கல் கவிஞர் 5. தமிழ்க் கொலை புரியாதீர் - புலவர் குழந்தை 6. **திரைத்தமிழ்** அ) 'விஞ்ஞானத்த வளர்க்கப் போறண்டி' எனத் தொடங்கும் பாடல் – உடுமலை நாராயண கவி ஆ) 'சும்மா கிடந்த நிலத்தை' எனத் தொடங்கும் பாடல் – பட்டுக்கோட்டை கல்யாண சுந்தரனார் இ) 'சமரசம் உலாவும் இடமே' எனத் தொடங்கும் பாடல் -மருதகாசி ஈ) 'உன்னை அறிந்தால்' எனத் தொடங்கும் பாடல் -கண்ணதாசன்	13	தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026 https://www.youtube.com/watch?v=Up55uhkk9zI
2	**புதுக்கவிதைகள்** 1. இலக்கிய வரலாறு - புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 2. கடமையைச் செய் - மீரா 3. ஓடு ஓடு சங்கிலி - சிற்பி பாலசுப்பிரமணியம் 4. ஒப்பிலாத சமுதாயம் - அப்துல் ரகுமான் 5. மரங்கள் - மு.மேத்தா 6. கரிக்கிறது தாய்ப்பால் - ஆரூர் தமிழ்நாடன் 7. ஐந்தாம் வகுப்பு 'அ' பிரிவு - நா. முத்துக்குமார் 8. ஹைகூ கவிதைகள் - 10 கவிதைகள்	13	தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026 https://www.youtube.com/watch?v=dX9ZaNJMaco
3	**பெண்ணியம்** 1. தொலைந்து போனேன் - தாமரை 2. நீரில் அலையும் முகம் - அ. வெண்ணிலா 3. தற்காத்தல் - பொன்மணி வைரமுத்து 4. ஏனிந்த வித்தியாசங்கள் ? - மல்லிகா 5. புதையுண்ட வாழ்க்கை - சுகந்தி சுப்ரமணியன்	10	தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026 https://www.youtube.com/watch?v=DLabokqWEdg
4	**சிறுகதைகள்** 1.இலக்கிய வரலாறு - சிறுகதையின் தோற்றமும் வளர்ச்சியும் 2. கனகாம்பரம் - கு.ப.ராஜகோபாலன் 3. கடிதம்- புதுமைப்பித்தன் 4. பொம்மை - ஜெயகாந்தன் 5. காய்ச்சமரம் - கி. ராஜநாராயணன் 6. காட்டில் ஒருமான் - அம்பை 7.வேட்கை - சூர்யகாந்தன்	14	தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026 https://www.youtube.com/watch?v=78u7iTN30U8

5	**பயிற்சிப் பகுதி** **அ. இலக்கணம்** 1. வல்லின ஒற்று மிகும், மிகா இடங்கள் - ஒற்றுப்பிழை நீக்கிஎழுதுதல் 2. ர,ற-ல,ழ,ள - ண,ந,ன வேறுபாடு - ஒலிப்பு நெறி, சொற்பொருள் வேறுபாடு அறிதல் **ஆ. படைப்பாக்கம்** 1. கவிதை- எழுதுதல் (15 வரிகள் முதல் 30 வரிகள் வரை) 2.சிறுகதை - எழுதுதல் (குறைந்தது 3 பக்கங்கள்)	10	தமிழ்மொழிப்பாடம் முதற்பருவம் 2025-2026 https://www.youtube.com/watch?v=B3wfM0QL6N8 https://www.youtube.com/watch?v=FchTlqAtwBU https://www.youtube.com/watch?v=gCP3gC-JQU4 https://www.youtube.com/watch?v=p9QOHD12Yeo
	Total	60	

Text book	1.	தமிழ் மொழிப்பாடம் – 2025-2026 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என். ஜி. பி. கலை அறிவியல் கல்லூரி, கோயம்புத்தூர் – 641048.
Reference Books	1.	பேராசிரியர் புலவர் சோம. இளவரசு, தமிழ் இலக்கிய வரலாறு, எட்டாம் பதிப்பு – 2024, மணிவாசகர் பதிப்பகம், சென்னை – 600 108.
	2.	பேராசிரியர் முனைவர் பாக்கியமேரி, முதற் பதிப்பு – 2023, இலக்கணம், இலக்கியவரலாறு, மொழித்திறன் – பூவேந்தன் பதிப்பகம், சென்னை – 600 004.

Journal and Magazines	இலக்கிய இதழ்கள்
E-Resources and Website	https://www.tamilvu.org

Learning Method	Lecture/ Tutorial / Student Seminar/GD/Assignment

Focus of the Course	Skill Development / Employability

Semester – I LANGUAGE –I: HINDI – I							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	25TLU1HA	HINDI – I	LANGUAGE- I	48	12	-	3

Preamble	The writing ability and develop reading skill
	The various concepts and techniques for criticizing literature
	The techniques for expansion of ideas and translation process
Prerequisite	To understand the language Hindi for communication

Course Outcomes (Cos)		
CO.No.	**Course Outcomes (COs) Statement**	**Bloom's Tax anomy Knowledge Level**
CO1	Learn the fundamentals of novels and stories	K2
CO2	Understand the principles of translation work	K3
CO3	Expose the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Apply the power of creative reading	K4

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

25TLU1HA	HINDI – I

Syllabus

Unit	Content	Hrs	Resources
1	गद्य – नूतन गद्य संग्रह (जयप्रकाश) पाठ1- रजिया पाठ, 2- मक्रील पाठ 3- बहता पानी निर्मला पाठ4- राष्ट्रपिता महात्मा गाँधी	13	Text Book
2	कहानी कुंज- डॉ वी.पी. 'अमिताभ'(पाठ 1-4)	13	Text Book
3	व्याकरण : शब्दविचार (संज्ञा, सर्वनाम,विशेषण)	12	Text Book
4	अनुच्छेद लेखन	12	Text Book
5	अनुवाद अभ्यास-III (केवल अंग्रेजी से हिन्दी में) (पाठ1 to 10)	10	Text Book
	Total	60	

Text books	1.	प्रकाशक: सुमित्र प्रकाशन 204 लीला अपार्ट्मेंट्स, 15 हेस्टिंग्स रोड' अशोक नगर इलाहाबाद-211001
	2.	प्रकाशक: गोविन्द प्रकाशन सदर बाजार, मथुरा उत्तरप्रदेश-281001
	3.	पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 टेगोर नगर इलाहाबाद-211024
	4.	पुस्तक: व्याकरण प्रदिप – रामदेव प्रकाशक: हिन्दी भवन 36 इलाहाबाद-211024
	5.	प्रकाशक: दक्षिण भारत प्रचार सभा चेनैई -17
Reference Books		-

Journal and Magazines	-
E-Resources and Website	-

Learning Method	Lecture/ Tutorial / Student Seminar/GD/Assignment

Focus of the Course	Skill Development / Employability

Semester – I MALAYALAM- I							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	25TLU1MA	MALAYALAM- I	LANGUAGE- I	48	12	-	3

Preamble	The writing ability and develop reading skill
	The various concepts and techniques for criticizing literature, to learn the techniques for expansion of ideas and translation process
	The competency in translating simple Malayalam sentences into English and vice versa
Prerequisite	To understand the language Malayalam for communication

Course Outcomes (Cos)		
CO. No.	**Course Outcomes (COs) Statement**	**Bloom's Tax anomy Knowledge Level**
CO1	Learn the fundamentals of novels and stories	K2
CO2	Understand the principles of translation work	K3
CO3	Expose the knowledge writing critical views on fiction	K3
CO4	Apply creative ability	K3
CO5	Build the power of creative reading	K4

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

25TLU1MA	MALAYALAM- I

Syllabus

Unit	Content	Hrs	Resources
1	**Novel** PathummayudeAdu	14	Text book
2	**Novel** PathummayudeAdu	10	Text book
3	**Short Story** Nalinakanthi	14	Text book
4	**Short Story** Nalinakanthi	10	Text book
5	**Practical Application** Expansion of ideas, General Essay and Translation	12	Text book
	Total	60	

Text books	1.	Vaikkam Muhammed Basheer, "PathummayudeAdu" (NOVEL), DC Books & Kottayam
	2.	T.Padmanabhan, "Nalinakanthi" (Short Story), DC Books & Kottayam.
Reference Books	1.	MalayalaNovel Sahithyam.
	2.	MalayalaCherukathaInnale Innu.

Journal and Magazines	-
E-Resources and Website	-

Learning Method	Lecture/ Tutorial / Student Seminar/GD/Assignment

Focus of the Course	Skill Development / Employability

Semester – I FRENCH - I							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	25TLU1FA	FRENCH - I	LANGUAGE- I	48	12	-	3

Preamble	The competence in general communication skills with oral, written and comprehension & expression
	The culture, life style and the civilization aspects of the French people as well as of France
	The students to acquire competency in translating simple French sentences into English and vice versa
Prerequisite	To understand the language French for communication

Course Outcomes (Cos)		
CO. No.	**Course Outcomes (COs) Statement**	**Bloom's Tax anomy Knowledge Level**
CO1	Learn the Basic verbs, numbers and accents	K2
CO2	Apply the adjectives and the classroom environment in France	K3
CO3	Select the Plural, Articles and the Hobbies	K3
CO4	Measure the Cultural Activity in France	K3
CO5	Evaluate the sentiments, life style of the French people and the usage of the conditional tense	K4

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1		✓	✓		✓
CO2	✓			✓	
CO3		✓			✓
CO4			✓		
CO5	✓			✓	✓

25TLU1FA	FRENCH - I

Syllabus

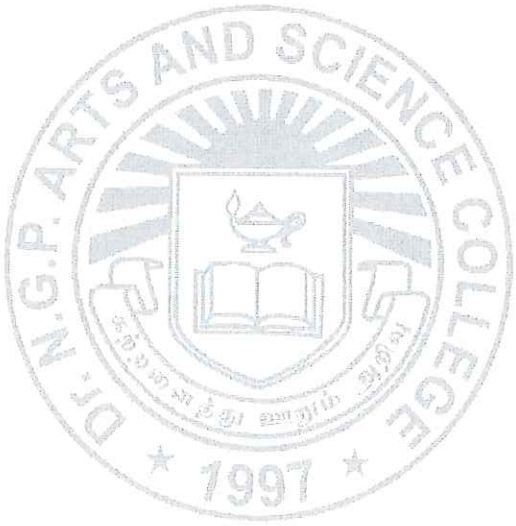
Unit	Content			Hrs	Resources
1	**Objectifs de Communication**	**Tâche**	**Activités de réception et de production orale**	14	Text book Salut I Page 10
	• Saluer • Enter en contact • avec quelqu'un. • Se presenter. • S'excuser	En cours de cuisine, premiers contacts avec les members d'un groupe	• Comprendre des personnes qui se saluent. • Ēchanger pour entrer en contact, se présenter, saluer, s'excuser. • Communiquer avec *tu* ou *vous*. • Comprendre les consignes de classe • Ēpeler son nom et son prénom. Computer jusqu'à 10.		
2	• Demander de se presenter. • Présenter quelqu'un . •	Dans la classe de français, se presenter et remplir une fiche pour le professeur.	• Comprendre les informations essentielles dans un échange en milieu professionnel. Ēchanger pour se presenteret présenterquelqu'un.	12	Text book Enchanté I Page 20
3	• Exprimer ses gouts.	Dans un café, participer à une soirée de rencontres rapides et remplir de taches d'appréciation	• Dans une soirée de recontresrapid comprendre des personnes qui échangent sur elles et sur leurs goût • Comprendre une personne qui parler des goûts de quelqu'un d'autre	14	Text book J'adore I Page 30
4	Demander à quelqu'un de faire quelque chose. Demander poliment. Parler d'actions passes. Tu veux bien?	Organiser un programme d'activités pour accueillir une personne importante	Comprendre une personne demande un service à quelqu'un. Demander à quelqu'un de faire quelque chose. • Imaginer et raconter au passé à partir de situations dessinées.	10	Text book Autoévaluation du module I Page 40 – Préparation au DELF A1 page 42 Tu veux bien page 46
5	**Practical Application** Make in Own Sentences			10	-
	Total			60	

Text book	1.	Regine Merieux, Yves Loiseau. 2012. LATITUDES – 1: Méthode de français (Page No: 9-55) Les Editions Dider, Paris, ImprimeenRoumanie par Canale en Janvier
Reference Book	1.	-

Journal and Magazines	-
E-Resources and Website	-

Learning Method	Lecture/ Tutorial / Student Seminar/GD/Assignment

Focus of the Course	Skill Development / Employability



SEMESTER – I LANGUAGE II: ENGLISH – I							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	**25ELU1EA**	**ENGLISH - I**	**LANGUAGE- II**	**48**	**-**	**12**	**3**

Preamble	This course has been designed for students to learn and understand • the effect of dialogue, imagery and varied genres • any spontaneous spoken discourse and respond to them with proper sentence structure • the transactional concept of English language.
Prerequisite	Basic comprehension of Language Skills

Course Outcomes (Cos)		
CO Number	**Course Outcomes (COs) Statement**	**Bloom's Taxonomy Knowledge Level**
CO1	Identify the various aspects in poetry.	K2
CO2	Infer linguistic and non-linguistic features of the context for understanding and interpreting.	K3
CO3	Construct sentences and convey messages effectively in real life situations.	K3
CO4	Apply different reading strategies with varying speed.	K3
CO5	Prepare modules with their own ideas and present them coherently in a grammatically correct form.	K3

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	✓	✓	✓		
CO2		✓	✓		
CO3	✓		✓	✓	✓
CO4		✓		✓	
CO5	✓		✓		✓

25ELU1EA | LANGUAGE II: ENGLISH – I

Syllabus

Unit	Content	Hrs	Resources
I	**Genre Studies** **Mathew Arnold: Dover Beach**- Author's Biography- title indications- outline- paraphrasing the poem- context of poem- form- poetic devices- enjambment- techniques– Annotations **Niyi Osundare: Our Earth Will Not Die**- Author's Biography- title indications-outline- paraphrasing the poem- context of poem- form- poetic devices-enjambment- techniques– Annotations **Charles Lamb: Christ's Hospital Five and Thirty Years Ago**- Author's biography- Narrative structure- Exploration of the text- passage analysis- insight of ideas- cohesion and context- style- language techniques- Annotation **James Hanson: A Famed Life - Ten Minute Comedy for Two Women** - Author's Biography- Plot Summary- Detailed summary and Analysis- Themes- Important Quotations- Characters- Description - analysis- Terms- Symbols- Critical analysis **Sheila Nayampalli Baruna: Alone** - Author's Biography- narrative structure- passage analysis- insight of ideas- cohesion and context- style- language techniques.	12	Text Book
II	**Listening Skills** Listening vs. hearing- Types of listening, Tips to enhance Listening Skills, Non-verbal and Verbal signs of active listening- Comprehensive Listening- Listening to pre-recorded audios on speeches, interviews and conversations-Listening Activities- Listening and responding to complaints (formal situation), Listening to problems and offering solutions (informal)	13	britishcouncil.org cambridgeenglish.org
III	**Speaking Skills** Formal occasions- Introducing oneself, Introducing others, Enquiries and Seeking permission, neural speaking -Making short presentations- Informal occasions- Requests, Offering help, Congratulating, Farewell party, graduation speech- Giving instructions to do a task and to use a device, Giving and asking directions	11	britishcouncil.org cambridgeenglish.org
IV	**Reading Skills** Study Skills: Skimming and Scanning- Reading different kinds of texts- Types of reading-Developing a good reading speed, reading aloud, Referencing skill- Word Power (Denotation and Connotation) - Reading comprehension, Data interpretation – Charts, Graphs, Advertisements - Cognitive Skills- Inference Making – Interpretation	12	britishcouncil.org cambridgeenglish.org
V	**Writing Skills** Sentence patterns, Note- making and note taking-Strategies - Paragraph writing: Structure and Principles - Academic Writing - Formal and Informal Letters, Report, Book /Movie Review - Infographics Writing	12	britishcouncil.org cambridgeenglish.org

	Total	**60**	

	Note: Case studies related to the above topics to be discussed (Examined Internal only)

Text book	1.	https://www.poetryfoundation.org/poems/43588/doverbeach
	2.	https://portal.abuad.edu.ng/lecturer/documents/1586771577our_earth_will_not_die.doc
	3.	http://l-adam-mekler.com/chucktwo.pdf
	4.	https://offthewallplays.com/wpontent/uploads/2017/04/1_pdfsam_A-famed-life-full-with-title-page.pdf
	5.	Nation, I. S. P and Jonathan Newton. 2009. *Teaching ESL/EFL Listening and Speaking*. Routledge, New York, United States of America.
	6.	Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. *Sparkle.* (1st Edn.) McGraw - Hill Education, Chennai, India.
Reference Books	1.	Rudzka, Brygida -Ostyn, 2003. Word Power: *Phrasal Verbs and Compounds: A Cognitive Approach,* Mouton de Gruyter, New York, United States of America.
	2.	Swales, John M. & Feak, Christine B. 2012. *Academic Writing for Graduate Students: Essential Tasks and Skills*, University of Michigan Press, Michigan, United States of America.
	3.	Sen, Leena. 2007. *Communication Skills*, Second Edition, Prentice Hall India Learning Private Limited, New Delhi, India.
	4.	O. Greene, John. 2021. *Essentials of Communication Skill and Skill Enhancement: A Primer for Students and Professionals*, Routledge publishers, United Kingdom.

Journal and Magazines	https://academic.oup.com/journals
E-Resources and Website	https://learnenglish.britishcouncil.org/ https://www.cambridgeenglish.org/learning-english/activities-for-learners/

Learning Method	Chalk and Talk/Assignment/Seminar/ Group Discussion/Case Study

Focus of the Course	Skill Development/ Employability

SEMESTER I
CORE I: BIOMOLECULES

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	25BCU1CA	BIOMOLECULES	CORE	48	-	-	4

Preamble	This course has been designed for students to learn and understand • The importance of biological macromolecules. • The influence and role of structure in reactivity of biomolecules. • Their role with regard to maintenance and perpetuation of the living systems.
Prerequisite	Basic knowledge about Biomolecules

Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Explain the structure, properties and biological significance of carbohydrates.	K2
CO2	Describe knowledge on the classification, properties and characterization of lipids.	K2
CO3	Articulate the classification, functions and acid base properties of amino acids. Illustrate the various levels of organization of proteins.	K3
CO4	Sketch the classification, structure, properties and functions of nucleic acids.	K3
CO5	Analyze the clinical consequences of Mineral and Vitamin deficiency. Experiment with pH and Buffer.	K4

Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

25BCU1CA	BIOMOLECULES

Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Carbohydrates Introduction to biological macromolecules. Carbohydrate - Definition, classification, physical properties and biological significance. Monosaccharides: Linear and cyclic structure, reactions of monosaccharides due to presence of hydroxyl, aldehyde and keto groups. Structure and properties of disaccharides – Maltose, Lactose and Sucrose. Polysaccharides – structure & biological functions of Homopolysaccharides (Starch, glycogen and Cellulose) & Heteropolysaccharides (Hyaluronic acid, Chondroitin sulphate and Heparin). Occurrence, importance and the structure of sugar derivatives: amino sugars, bacterial cell wall polysaccharides - peptidoglycan.	10	Text Book, Reference book and NPTEL
II	Lipids Definition, classification and physico-chemical properties of lipids. Storage lipids: Fatty acids - types, nomenclature, structure & properties. Simple and mixed triglycerides. Characterization of fats – iodine value, saponification value, acid number, acetyl number, polenske number, Reichert-Meissl number. Structural lipids – phospholipids and glycolipids. Structure and functions of steroids - cholesterol. Eicosanoids - an overview.	8	Reference Book, NPTEL, E-Resources
III	Amino acids and Proteins Classification and general properties of amino acids. Chemical reactions of amino acids due to carboxyl groups and amino groups, colour reactions of amino acids. Peptide bond - structure and properties. Protein - classification and physico-chemical properties. Organization of protein Structure – Primary (Insulin), Secondary (Keratin, Collagen), Tertiary (Myoglobin) & Quaternary structure (Hemoglobin). Denaturation and renaturation of proteins.	10	Text book, NPTEL, and YouTube Videos
IV	Nucleic acids Structures of Purines, Pyrimidines, Nucleosides and Nucleotides. Structure and biological significance of DNA double helical structure. A, B & Z forms of DNA, superhelicity. Denaturation & renaturation of DNA. Properties of DNA – Hypochromic effect, melting temperature, viscosity. Structure and functions of mRNA, tRNA, rRNA, snRNA, miRNA, siRNA. Chemical reactions of DNA and RNA.	8	Text book, NPTEL, and E-resources

V	Minerals, Vitamins, Water, pH & Buffers Micro and Macro Minerals - Clinical Significance. Vitamins – Definition, classification. Fat soluble (Vitamin A, D, E, K) and Water-soluble vitamins (Vitamin B Complex & Vitamin C) - sources, functions and deficiencies, hypervitaminosis. Water: Structure, Physical properties of water, weak interaction in aqueous solutions. pH – Introduction, buffers, Henderson-Hasselbalch equation, biological buffer system.	12	Text book and Reference book
	Total	**48**	

Text Book	**1.**	Jain, J.L., Jain, N. and Jain, S., 2016, "Fundamentals of Biochemistry", 7th edition, S. Chand and Company Publication, Chennai
Reference Books	**1.**	Nelson, D.L. and Cox, M.M., 2017, "Lehninger's Principles of Biochemistry", 7th edition, W.H. Freeman and Company, New York.
	2.	Berg, J.M., Tymoczko, J.L., Gatto Jr, G.J. and Stryer, L., 2015, "Biochemistry", 8th edition, W.H. Freeman and Company, New York.
	3.	Voet, D. and Voet, J.G., 2018, "Biochemistry", 5th edition, John Wiley and Sons Pvt. Ltd., New York.
	4.	Rodwell, V.W., Bender, D.A., Botham, K.M., Kennelly, P. and Weil, P.A., 2018, "Harper's Illustrated Biochemistry", 31st edition, The McGraw-Hill Inc., New York.

Journal and Magazines	https://www.mdpi.com/journal/biomolecules https://www.pulsus.com/journal-biomolecules-biochemistry.html https://biotech.journalspub.info/?journal=IJBB
E-Resources and Website	https://archive.nptel.ac.in/courses/104/102/104102016/ [NPTEL] https://www.khanacademy.org/test-prep/mcat/biomolecules https://www.mooc-list.com/course/biochemistry-saylororg https://courseware.cutm.ac.in/courses/biomolecules/ https://www.biologydiscussion.com/biomolecules/biomolecules-top-4-classes-of-biomolecules/11169

Learning Methods	Chalk and Talk/ Video tutorials/PPT/ GD/ Assignment/ Seminar

Focus of the Course	Skill Development / Employability

Semester - I
CORE II : CELL BIOLOGY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	25BCU1CB	CELL BIOLOGY	CORE	36	-	-	3

Preamble	This course has been designed for students to learn and understand • structure and purpose of basic components of Prokaryotic and Eukaryotic cells • how various tissue types are united to form organs and how those organs operate, which is determined by the characteristics of the individual tissues
Prerequisite	Knowledge in structure of cells

Course Outcomes (COs)

CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Differentiate cellular types based on origin and evolution.	K3
CO2	Explain the structure and functions of various cellular organelles.	K1
CO3	Demonstrate microfilament polymerization, assembly and intracellular organization	K3
CO4	Explain the importance and functions cell-matrix and cell-cell interactions.	K2
CO5	Explicate the basic principles of cell division and cell cycle	K3

Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

25BCU1CB	CELL BIOLOGY

Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Introduction to cell biology An overview of cells - origin and evolution of cells and cell theory. Classification of cells: prokaryotic (Archaea and Eubacteria) and eukaryotic cells (animal and plant cells). Comparison of cells: microbial, plant, and animal cells. Cells as experimental models- prokaryotic and eukaryotic cells. Exceptions to cell theory- Mycoplasma, Viruses, Virioids, prions.	07	Text Book
II	Structure and Functions of different cell organelles Structure and functions- Golgi apparatus, Ribosomes, Nucleus, Nuclear envelope, Nuclear-pore complex, RER, SER, Lysosomes, Glyoxysomes, Mitochondria, Chloroplast and Peroxisomes. Chromosomes- Structure, Types and functions, Special types of chromosomes – lamp brush chromosomes, polytene chromosomes. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure.	08	Reference Book
III	Cytoskeleton proteins Structure and organization- Actin filaments. Microfilament polymerization: tread milling and role of ATP. Non-muscle myosin. Intermediate filament proteins- assembly and intracellular organization. Assembly, organization and movement- cilia and flagella.	07	Text Book
IV	Cell wall, extracellular matrix, cell membrane and transport Cell wall and cell matrix proteins- prokaryotic and eukaryotic cells. Structure and function- capsule. Interactions- Cell-matrix and cell-cell. Junctions- adherence, tight and gap, desmosomes, hemi-desmosomes, focal adhesions and plasmodesmata. Cell signaling and receptors (overview). Cell membrane- fluid mosaic model. Transport across membrane- Osmosis, diffusion, uniport, symport antiport, active and passive transport, and ion channels	07	NPTEL
V	Cell Division and cell cycle Cell division- Mitosis and Meiosis (prokaryotes and eukaryotes). Cell cycle- phases of cell cycle (eukaryotic cell cycle, restriction point and checkpoints- overview). Cell death- apoptosis and necrosis (overview). Transformed cells-	07	You Tube Videos

	salient features. Stem cells and maintenance of adult Tissues, Embryonic Stem cells and Therapeutic cloning.		
	Total	36	

Text Book	**1.**	Verma, P S and Agarwal, V K, 2004, "Cell Biology, Genetics, Molecular Biology, Evolution and Ecology", 1st edition, S. Chand Publications, New Delhi.
Reference Books	**1.**	Cooper G M. and Hausman R E, 2015, "The cell: A Molecular approach", 6th edition, ASM Press, Washington D.C, USA.
	2.	Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P, 2015, "Molecular Biology of the cell" 6th edition, Taylor and Francis Company, United Kingdom.
	3.	Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Lawrence Zipursky and James Darnell, 2016. "Molecular Cell Biology", 8th edition, WH Freeman and Company, New York
	4.	Kar G, Iwasa J and Marshall M, 2016. "Karp's Cell and Molecular Biology: Concepts and Experiments", 8th edition, John Wiley and Sons, USA.

Journal and Magazines	https://bmcmolcellbiol.biomedcentral.com/ https://www.springer.com/gp/journal-impact/life-sciences/cell-biology
E-Resources and Website	https://onlinecourses.nptel.ac.in/noc22_bt33 https://www.udemy.com/course/basics-on-cell-biology

Learning Method	Chalk and Talk/Assignment/Seminar

Focus of the Course	Skill Development/Employability

Semester – I CORE PRACTICAL -I: BIOMOLECULES AND CELL BIOLOGY							
Semester	**Course Code**	**Course Name**	**Category**	**L**	**T**	**P**	**Credits**
I	**25BCU1CP**	**BIOMOLECULES AND CELL BIOLOGY**	**CORE PRACTICAL**		**-**	**48**	**2**

Preamble	This course has been designed for students to learn and understand • The essential laboratory skills for preparing and analyzing biomolecules • The fundamental cell biology concepts • The practical competency in modern biological investigations
Prerequisite	Basic Biological knowledge

Course Outcomes (Cos)		
CO Number	**Course Outcomes (COs) Statement**	**Bloom's Taxonomy Knowledge Level**
CO1	Recall the basic principles of biomolecule classification and cell structure.	K1
CO2	Identify monosaccharides, disaccharides, amino acids, and nucleic acids using qualitative tests.	K2
CO3	Demonstrate preparation of molar, normal, and buffer solutions with appropriate pH adjustments.	K3
CO4	Analyze lipid samples for saponification, acid, and iodine numbers.	K4
CO5	Differentiate between stages of mitosis and meiosis through microscopic examination.	K4

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓

25BCU1CP	BIOMOLECULES AND CELL BIOLOGY

S.No	List of Practicals
	BIOMOLECULES
1	Preparation of Normal and Molar solutions, Preparation of Buffer Solutions- Phosphate, Citrate, Tris, Acetate
2	Determination and adjustment of pH using pH paper and pH meter
3	Qualitative Analysis of carbohydrates: Monosaccharides: Glucose, Fructose, Galactose. Disaccharides: Sucrose, Lactose, Maltose. Polysaccharides: Starch
4	Qualitative analysis of amino acids: Histidine, Tyrosine, Tryptophan, Cysteine and Arginine.
5	Determination of Saponification number, acid number and Iodine number of edible oil.
6	Qualitative test for nucleic acids.
	CELL BIOLOGY (DBT Star Scheme Practicals)
7	Mitosis in Onion root tip squash.
8	Meiosis in grasshopper testis squash.
9	Fractionation of cellular components.
10	Staining and visualization of mitochondria by Janus green stain.
11	Cell Types - Microbial, Animal and Plant Morphometric measurements
12	Identification and study of cancerous cells using permanent slides and photomicrographs.

Texk Books	1.	Jayaraman, J, 2011, "Laboratory Manual in Biochemistry", 2nd Edition, New Age International Pvt. Ltd., India.
	2.	Kleinsmith, L J, Hardin, J and Bertoni, G P, 2011, "Becker's The World of the Cell", 8th Edition, Pearson/Benjamin-Cummings, Boston, USA.

Learning Method	Demonstration/ Hands on Experiments

Focus of the Course	Skill Development/ Employability

Semester – I IDC I: CHEMISTRY							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	25CEU1IA	CHEMISTRY	IDC	36	-	-	3

Preamble	This course has been designed for students to learn and understand • The concept of expressing concentration of solutions • The concepts of chemical kinetics and catalysis • About the bonding and basic organic chemistry.
Prerequisite	Knowledge on Basic Chemistry

Course Outcomes (Cos)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Understand the concept of concentration of the solutions.	K2
CO2	Infer the acid and basic properties of solutions.	K2
CO3	Interpret the concept of the bonding in molecules.	K2
CO4	Summarize the basic concepts of the stereo chemistry.	K2
CO5	Explain the Chemical kinetics and catalysis.	K2

Mapping with Program Outcomes:					
Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓		✓
CO2	✓		✓	✓	
CO3		✓			✓
CO4			✓	✓	
CO5	✓	✓		✓	✓

25CEU1IA	CHEMISTRY

Syllabus

Unit	Content	Hrs	Resources
I	**Solutions** Normality, molarity, molality, mole fraction, mole concept. Primary and secondary standards – Preparation of standard solutions. Principle of Volumetric analysis (with simple problems) - Indicators – Theory of indicators - Ostwald and quinonoid theory.	7	Text Book
II	**Acids and Bases** Acid base theories – Strength of acids and bases – Equilibrium constant and ionic constant of water- pH, pKa, pKb, Buffer solution, pH and pOH simple calculations.	7	Text Book
III	**Chemical Bonding** Types of bonding - Ionic Bond: Nature of ionic bond, factors influencing the formation of ionic bond, Covalent and coordinate bond - Molecular Orbital Theory (MO) – MO configuration of H_2, N_2, O_2 - Bond order – diamagnetism and paramagnetism.	8	Text Book
IV	**Stereo Chemistry** Isomerism, Structural isomerism - Symmetry of elements (Plane, Centre and Axis of symmetry), Optical isomerism of lactic acid and tartaric acid, Enantiomers, Diastereomers – Separation of racemic mixture, Geometrical isomerism (maleic and fumaric acid). R/S and E/Z configuration assignments for simple molecules.	7	Text Book
V	**Chemical Kinetics and Catalysis** Rate of reaction, rate law, order, molecularity, first order rate law, half-life period of first order equation, pseudo first order reaction, zero and second order reactions. Catalysis – homogenous, heterogeneous and enzyme catalysis, Industrial applications of enzyme catalysis.	7	Text Book
	Total	**36**	

Text book	1.	Puri. B.R, Sharma. L.R and Pathania. M.S, 2017, "Principles of Physical Chemistry", Forty seventh Edition, John Wiley and Sons & USA.
	2.	Madhan. R.D, 2016, "Modern Inorganic Chemistry", Tenth edition, Mc Graw Hill Company & USA.
Reference Books	1.	Lee. J.D, 2002, "A New Concise Inorganic Chemistry", Ffifth Edition, ELBS &UK.
	2.	Jain. M.K and Sharma. S.C, 2012, "Modern Organic Chemistry", Vishal publishing Co & New Delhi.
	3.	Puri. B.R, Sharma. L.R and Kalia. K.C, 2016, "Principles of Inorganic Chemistry", Vishal Publishing & Co & New Delhi.

	4.	Glasstone. S and Lewis. D, 2014, "Elements of Physical Chemistry", Second Edition, Macmillan Ltd, London.

Journal and Magazines	https://onlinelibrary.wiley.com/journal/10974601
E-Resources and Website	https://www.uou.ac.in/lecturenotes/science/MSCCH-17/CHEMISTRY%20LN%201%20STERIOCHEMISTRY.pdf

Learning Method	Chalk and Talk/Assignment/Seminar/ Group Discussion/Case Study

Focus of the Course	Skill Development/ Employability/ Entrepreneurial Development/ Innovations

Semester – I IDC PRACTICAL: CHEMISTRY							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	25CEU1IP	CHEMISTRY	IDC PRACTICAL	-	-	48	2

Preamble	This course has been designed for students to learn and understand • The practical skills in volumetric and qualitative analysis of organic compounds • The standard titration techniques and systematic identification of organic functional groups • The accuracy, observation, and analytical reasoning in chemical experiments
Prerequisite	Knowledge of General Chemistry and organic functional groups

Course Outcomes (Cos)		
CO Number	**Course Outcomes (COs) Statement**	**Bloom's Taxonomy Knowledge Level**
CO1	Accurately perform volumetric titrations to estimate concentrations of acids, bases, and ferrous compounds	K3
CO2	Apply redox titration techniques for quantitative determination of ferrous ions and related substances	K3
CO3	Identify and analyze organic functional groups using systematic qualitative tests	K2
CO4	Differentiate between various organic compounds through chemical reactions	K3
CO5	Demonstrate precision, accuracy, and proper laboratory practices in quantitative and qualitative chemical analyze	K3

Mapping with Program Outcomes:					
Cos / POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	✓		✓	✓	✓
CO2	✓		✓	✓	
CO3	✓		✓	✓	✓
CO4	✓	✓	✓		✓
CO5		✓		✓	✓

25CEU1IP	CHEMISTRY

S.No	List of Experiments
	Volumetric analysis
1	Estimation of sodium hydroxide using standard sodium carbonate.
2	Estimation of hydrochloric acid using standard oxalic acid.
3	Estimation of oxalic acid using standard sulphuric acid.
4	Estimation of ferrous sulphate using standard mohr's salt solution.
5	Estimation of oxalic acid using standard ferrous sulphate solution.
6	Estimation of ferrous ions using mohr's salt solution.
	Systematic analysis of organic compounds
7	Systematic analysis of organic compounds containing amides.
8	Systematic analysis of organic compounds containing diamides.
9	Systematic analysis of organic compounds containing carbohydrates.
10	Systematic analysis of organic compounds containing monocarboxylic acids.
11	Systematic analysis of organic compounds containing dicarboxylic acids.
12	Systematic analysis of organic compounds containing amines.

Texk Books	1.	V. Venkateswaran, R. Veeraswmay and A.R. Kulandaivelu, 1997, "Basic Principles of Practical Chemistry" 2nd Edition. Sultan Chand and Sons, New Delhi.
	2.	J. Mendham, R.C. Denney, J.D. Bames and M. Thomas, 1989, "Vogel's Text book of Quantitative Analysis" 6th Edition, Pearson Education.

Learning Method	Demonstration/ Hands on Experiments

Focus of the Course	Skill Development/ Employability

Semester – I

AECC I: ENVIRONMENTAL STUDIES

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	25MBU1AA	ENVIRONMENTAL STUDIES	AECC	24	-	-	2

Preamble	This course has been designed for students to learn and understand • Multi-disciplinary aspects of Environmental studies • Importance to conserve the biodiversity • Causes of Pollution and its control
Prerequisite	Aware the basics of environmental components

Course Outcomes (Cos)

CO Number	Course Outcomes (Cos) Statement	Bloom's Taxonomy Knowledge Level
CO1	To understand the importance of natural resources in order to conserve for the future	K1
CO2	To impart knowledge on Natural resources and its conservation	K2
CO3	To impart knowledge on Biodiversity and its conservation	K3
CO4	To create awareness on effects, causes and control of air, water, soil and noise pollution etc.,	K4
CO5	To build awareness about sustainable development and Environmental protection	K1

Mapping with Programme Outcomes

Cos/POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓
CO4	✓	✓	✓		
CO5	✓	✓	✓	✓	✓

25MBU1AA - ENVIRONMENTAL STUDIES
Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Introduction to Environmental studies& Ecosystems: components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance - Energy flow in an ecosystem: food chain, food web and ecological succession.	5	Text book and Website
II	Natural Resources: Renewable and Non-renewable Resources: Land Resources and land use - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs.	5	Text book and Website
III	Biodiversity and Conservation: Global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	4	Text book and Website
IV	Environmental Pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution. Nuclear hazards and human health risks. Environment Laws: Environment Protection Act; Prevention & Control of Pollution Act – Air & Water. Wildlife Protection Act; Forest Conservation Act; Indigenous knowledge used for sustainable forest use.	5	Text book and Website
V	Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Role of Information Technology in Environment and human health. Role of the Colleges, Teachers and Students in village adoption towards clean, green and make in villages in various aspects.	5	Text book and Website
	Total	**24**	

Text Book	1.	*Carson, R.* 2002. **Silent Spring.** *Houghton Mifflin Harcourt*
	2.	*Gadgil, M., & Guha, R.*1993. **This Fissured Land: An Ecological History of India**. *Univ. of California Press.*
Reference Books	1.	*Gleeson, B. and Low, N. (eds.)* 1999. **Global Ethics and Environment, London, Routledge**.
	2.	*Gleick, P.H.* 1993. **Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security.** *Stockholm Env. Institute, Oxford Univ. Press.*
	3.	*Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll.* 2006, **Principles of Conservation Biology**. *Sunderland: Sinauer Associates*.
	4.	*Grumbine, R. Edward, and Pandit, M.K.* 2013. **Threats from India's Himalaya dams. Science,** *339: 36-37.*

Journal and Magazines	https://www.hzu.edu.in/bed/E%20V%20S.pdf
E-Resource and Websites	https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf

Learning Methods	Chalk and Talk/ Seminar/ Assignment

Focus of the Course	Skill Development/Employability/Social Awareness and Environment