

Sadakathullah Appa College

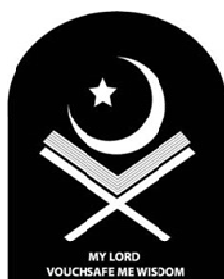
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Rahmath Nagar, Tirunelveli- 11.

Tamil Nadu.

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE



CBCS SYLLABUS

**Learning Outcome-based Curriculum Framework for
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE (B.Sc.)**
**(Applicable for the students admitted from June 2025 as per
the Resolutions of the Academic Council Meeting held on 11.10.2025)**

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B.Sc. Artificial Intelligence and Data Science with Allied Mathematics
DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS & MARKS
(Applicable for students admitted in June 2025 and onwards)

Part	Course	Semester	Hours	Credits	Papers	Marks			
I	Tamil / Arabic	I to IV	24	12	4	400			
II	English	I to IV	24	12	4	400			
III	Core, Core Elective, Core Practicals, Internship and Project	I to VI	92	80	23	2300			
	Allied& Allied Practicals	I to IV	24	20	6	500			
IV	SEC, NME, Foundation Course&EVS	I – IV	16	16	8	400			
V	Extension Activity			1*	1*	100*			
TOTAL			180	140+1*	45+1*	4100			
SEMESTER WISE DISTRIBUTION OF HOURS									
Part	I	II	III					IV	Total
SEM	T/A	ENG	C	I	P	E	AL	SEC/FC/EVS	
I	6	6	8	-			6	4	30
II	6	6	8	-			6	4	30
III	6	6	8	-			6	4	30
IV	6	6	8	-			6	4	30
V	-	-	24	-		6	-	-	30
VI	-	-	18	-	6	6	-		30
Total	24	24	74	-	6	12	24	16	180

Sadakathullah Appa College, Rahmath Nagar, Tirunelveli – 627 011.

Programme Structure & Credits

B.Sc Artificial Intelligence and Data Science

Se m	Par t	Course Type	Title of the Course	Course code	H/W	C	Marks
I	I	Lang-I	Prose	24ULAR11	6	3	100
			பொதுத் தமிழ் 1 - தமிழ் இலக்கிய வரலாறு - 1	24ULTA11			
	II	Lang-II	General English - I	24ULEN11	6	3	100
	III	Core-I	Programming in C and Data Structures	24UCAS11	5	5	100
	III	Core-P-I	Programming in C Lab	24UCAS1P	3	3	100
	III	EC-T-I	Allied Course-I Algebra And Calculus	24UAMA15	6	5	100
	IV	SEC-I	Foundations of Artificial Intelligence	24UNAS11	2	2	50
	IV	FC	Web Technology	24UFAS11	2	2	50
					30	23	600
II	I	Lang-I	Grammar	24ULAR21	6	3	100
			பொதுத் தமிழ் 2 - தமிழ் இலக்கிய வரலாறு - 2	24ULTA21			
	II	Lang-II	General English - II	24ULEN21	6	3	100
	III	Core-II	Programming in Python	24UCAS21	5	5	100
	III	Core-P-II	Programming in Python Lab	24UCAS2P	3	3	100
	III	EC-T-II	Numerical Methods	24UAMA25	6	5	100
	IV	SEC-II	Data Analytics Using Spread Sheets	24UNAS21	2	2	50
	IV	SEC-III	Value Education –I	24USVE2A	2	2	50
			Value Education -II	24USVE2B			
					30	23	600

Sem	Part	Course Type	Title of the Course	COURSE CODE	H/W	C	Marks		
							I	E	T
III	I	Lang-I	Communication skill in Arabic	24ULAR31	6	3	25	75	100
			பொதுத்தமிழ் -3 தமிழக வரலாறும் பண்பாடும்	24ULTA31					
	II	Lang-II	General English - III	24ULEN31	6	3	25	75	100
	III	Core-III	Database Management Systems	24UCAS31	5	5	25	75	100
	III	Core-P-III	Database Management Systems Lab	24UCAS3P	3	3	40	60	100
	III	EC-T-III	Machine Learning	24UAAS31	4	4	25	75	100
	IV	EC-P-III	Machine Learning Lab	24UAAS3P	2	1	20	30	50
	IV	SEC-IV	Soft Skills	24USSS31A	2	2	15	35	50
			Design Thinking	24USAS31B					
			MOOCs	24USOC31C-G*					
			Naan Muthalvan	24USNM31H					
	IV	SEC-V	Advanced Excel and Power BI Lab	24USAS32	2	2	15	35	50
					30	23			650
IV	I	Lang-I	Quran and Hadith	24ULAR41	6	3	25	75	100
			பொதுத்தமிழ் - 4 தமிழும் அறிவியலும்	24ULTA41					
	II	Lang-II	General English - IV	24ULEN41	6	3	25	75	100
	III	Core-IV	Data Science	24UCAS41	5	5	25	75	100
	III	Core-P-IV	Data Science Lab	24UCAS4P	3	3	40	60	100
	III	EC-T-IV	Computer Vision	24UAAS41	4	4	25	75	100
	III	EC-P-IV	Computer Vision Lab	24UAAS4P	2	1	20	30	50
	IV	SEC-VI	Human Computer Interface	24USAS41	2	2	15	35	50
	IV	EVS	Environmental Studies	21UENS41	2	2	15	35	50
	V	EXT	i) NCC ii) NSS iii) Youth Red Cross iv) Red Ribbon Club v) Sadakath Outreach Programme (SOP) vi) Physical Education vii) Youth Welfare viii) Yoga	24UXNC41 24UXNS41 24UXYR41 24UXRR41 24UXOP41 24UXPE41 24UXYW41 24UXYG41		1**			100
	Internship/Industrial Training during the 2 nd year vacation – credits be given in the fifth semester mark statement								
					30	23 +1			750

* MOOCs offered by

SWAYAM/NPTEL (With 40% pass)	24USOC31C
SWAYAM/NPTEL (With 50% pass)	24USOC31D
SWAYAM PLUS	24USOC31E
IGNOU	24USOC31F
COURSERA/ EDX	24USOC31G

Sem	Part	Course Type	Title of the Course	Code	H/W	C	Marks		
V	III	Core-V	Large Language And Vision Model	24UCAS51	6	5	25	75	100
	III	Core-VI	Deep Learning	24UCAS52	5	4	25	75	100
	III	Core-VII	Software Engineering for Data Science	24UCAS53	5	4	25	75	100
	III	Core-P-V	Large Language and Vision Model Lab	24UCAS5P1	4	2	40	60	100
	III	Core-P-VI	Deep Learning Lab	24UCAS5P2	4	2	40	60	100
	III	EC-V	Computer Network	24UEAS51A	3	3	25	75	100
			Robotic Process Automation	24UEAS51B					
			DEVOPS	24UEAS51C					
	III	EC-VI	Operating System	24UEAS52A	3	3	25	75	100
			Quantum Computing	24UEAS52B					
			MLOPS	24UEAS53C					
	III	Internship	Internship (Credits to be awarded on completion of Internship)	24UIAS51	-	2			100
					30	25			800
VI	III	Core-VIII	Natural Language Processing	24UCAS61	5	5	25	75	100
	III	Core-IX	Internet of Things	24UCAS62	5	5	25	75	100
	III	Core-X	Project	24UCAS63	6	3	25	75	100
	III	Core-P-VII	Natural Language Processing Lab	24UCAS6P1	4	2	40	60	100
	III	Core-P-VIII	Internet of Things Lab	24UCAS6P2	4	2	40	60	100
	III	EC-VII	Cloud Computing	24UEAS61A	3	3	25	75	100
			Computational Biology	24UEAS61B					
			Blockchain	24UEAS61C					
	III	EC-VIII	Cyber Security	24UEAS62A	3	3	25	75	100
			Agentic AI	24UEAS62B					
			Ethics for Artificial Intelligence	24UEAS62C					
					30	23			700
				TOTAL	180	140 +1**			4100

EC – Elective Course FC – Foundation Course

VE – Value Education SEC – Skill Enhancement Course

Discipline Specific – Core and Related Discipline

Generic – Unrelated Discipline ** Extra Credits for Part – V Extension Activities

**B.Sc. Artificial Intelligence and Data Science
COURSE STRUCTURE (CBCS)**

(Applicable for students admitted in June 2025 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

SEM	Title of the Paper	COURSE CODE	H/W	C	I	E	T
PART I - TAMIL							
I	பொதுத் தமிழ் 1 - தமிழ் இலக்கிய வரலாறு - 1	24ULTA11	6	3	25	75	100
II	பொதுத் தமிழ் 2 - தமிழ் இலக்கிய வரலாறு - 2	24ULTA21	6	3	25	75	100
III	பொதுத்தமிழ் -3 தமிழக வரலாறும் பண்பாடும்	24ULTA31	6	3	25	75	100
IV	பொதுத்தமிழ் - 4 தமிழும் அறிவியலும்	24ULTA41	6	3	25	75	100
TOTAL			24	12	100	300	400
PART I - ARABIC							
I	Prose	24ULAR11	6	3	25	75	100
II	Grammar	24ULAR21	6	3	25	75	100
III	Communication skill in Arabic	24ULAR31	6	3	25	75	100
IV	Quran and Hadith	24ULAR41	6	3	25	75	100
TOTAL			24	12	100	300	400
PART II - ENGLISH							
I	General English – I	24ULEN11	6	3	25	75	100
II	General English - II	24ULEN21	6	3	25	75	100
III	General English – III	24ULEN31	6	3	25	75	100
IV	General English - IV	24ULEN41	6	3	25	75	100
TOTAL			24	12	100	300	400

PART III (Core, Core Elective, Core Praticals, Internship and Project)

Sem	Part	Course Type	Title of the Course	Course Code	H/W	C	I	E	Marks
I	III	Core-I	Programming in C and Data Structures	24UCAS11	5	5	25	75	100
	III	Core-P-I	Programming in C Lab	24UCAS1P	3	3	40	60	100
II	III	Core-II	Programming in Python	24UCAS21	5	5	25	75	100
	III	Core-P-II	Programming in Python Lab	24UCAS2P	3	3	40	60	100
III	III	Core-III	Database Management Systems	24UCAS31	5	5	25	75	100
	III	Core-P-III	Database Management Systems Lab	24UCAS3P	3	3	40	60	100
IV	III	Core-IV	Data Science	24UCAS41	5	5	25	75	100
	III	Core-P-IV	Data Science Lab	24UCAS4P	3	3	40	60	100
V	II I	Core-V	Large Language And Vision Model	24UCAS51	6	5	25	75	100
	II I	Core-VI	Deep Learning	24UCAS52	5	4	25	75	100
	II I	Core-VII	Software Engineering for Data Science	24UCAS53	5	4	25	75	100
	II I	Core-P-V	Large Language and Vision Model Lab	24UCAS5P1	4	2	40	60	100
	II I	Core-P-VI	Mini Project using Deep Learning Lab	24UCAS5P2	4	2	40	60	100
	II I	EC-V	Computer Network	24UEAS51A	3	3	25	75	100
			Robotic Process Automation	24UEAS51B					
			DEVOPS	24UEAS51C					
	II I	EC-VI	Operating System	24UEAS52A	3	3	25	75	100
			Quantum Computing	24UEAS52B					
			MLOPS	24UEAS53C					
	II I	Internship	Internship (Credits to be awarded on completion of Internship)	24UIAS51	-	2			100
VI	II I	Core-VIII	Natural Language Processing	24UCAS61	5	5	25	75	100
	II I	Core-IX	Internet of Things	24UCAS62	5	5	25	75	100
	II I	Core-X	Project	24UCAS63	6	3	-	-	100
	II I	Core-P-VII	Natural Language Processing Lab	24UCAS6P1	4	2	40	60	100
	II I	Core-P-VIII	Internet of Things Lab	24UCAS6P2	4	2	40	60	100
	II I	EC-VII	Cloud Computing	24UEAS61A	3	3	25	75	100
			Computational Biology	24UEAS61B					
			Blockchain	24UEAS61C					
	II I	EC-VIII	Cyber Security	24UEAS62A	3	3	25	75	100
			Agentic AI	24UEAS62B					
			Ethics for Artificial Intelligence	24UEAS62C					
					92	80	645	1455	2300

PART – III (Allied& Allied Practical)

Se m	Par t	Course Type	Title of the Course	Course code	H / W	C	I	E	Mar ks
I	III	EC-T-I	Algebra And Calculus	24UAMA15	6	5	25	75	100
II	III	EC-T-II	Numerical Methods	24UAMA25	6	5	25	75	100
III	III	EC-T-III	Machine Learning	24UAAS31	4	4	25	75	100
	IV	EC-P-III	Machine Learning Lab	24UAAS3P	2	1	20	30	50
IV	III	EC-T-IV	Computer Vision	24UAAS41	4	4	25	75	100
	III	EC-P-IV	Computer Vision Lab	24UAAS4P	2	1	20	30	50
				Total	24	20	140	360	500

PART IV (SEC, NME, FC, EVS)

Se m	Par t	Course Type	Title of the Course	Course code	H/ W	C	Marks		
							I	E	Tot al
I	IV	SEC-I	Foundations of Artificial Intelligence	24UNAS11	2	2	15	35	50
	IV	FC	Web Technology	24UFAS11	2	2	15	35	50
II	IV	SEC-II	Data Analytics Using Spread Sheets	24UNAS21	2	2	15	35	50
	IV	SEC-III	(Value Education –I & II)	24USVE2A 24USVE2B	2	2	15	35	50
III	IV	SEC-IV	Soft Skills	24USSS31A	2	2	15	35	50
			Design Thinking	24USAS31B					
			MOOCs	24USOC31C-G*					
			Naan Muthalvan	24USNM31H					
	IV	SEC-V	Advanced Excel and Power BI Lab	24USAS32	2	2	15	35	50
IV	IV	SEC-VI	Human Computer Interface	24USAS41	2	2	15	35	50
	IV	EVS	Environmental Studies	21UENS41	2	2	15	35	50
				Total	16	16	120	280	400

PART – V – Extension Activities

Sem	Part	Course Type	Title of the Course	Course Code	H/W	C	Marks		
							I	E	T
IV	V	EA	i) NCC ii) NSS iii) Youth Red Cross iv) Red Ribbon Club v) Sadakath Outreach Programme (SOP) vi) Physical Education vii) Youth Welfare viii) Yoga	24UXNC41 24UXNS41 24UXYR41 24UXRR41 24UXOP41 24UXPE41 24UXYW41 24UXYG41	-	1**			100
				Total					100

Programme Outcomes (PO)

PO No.	Upon completion of the B.Sc. Degree programme, the graduates will be able to:
PO-1	Disciplinary Knowledge • Acquire scientific knowledge and an understanding of major concepts and theoretical principles.
PO-2	Creative Thinking and Practical Skills / Problem-Solving Skills • Enrich skills of observation and research-related abilities to draw logical inferences from scientific experiments or programming, and develop creative thinking skills to generate novel ideas. • Hone problem-solving skills in theoretical, experimental, and computational areas, and apply them in research fields and real-life situations.
PO-3	Sense of Inquiry and Skilled Communicator • Develop the capability to raise appropriate questions relating to current or emerging issues encountered in the scientific field, and plan, execute, and express the results of experiments or investigations through technical writings and oral presentations.
PO-4	Ethical Awareness / Team Work / Environmental Conservation and Sustainability • Equip themselves to conduct work as an individual, a member, or a leader in diverse teams while upholding values such as honesty and precision — thus preventing unethical behaviours such as fabrication, falsification, misrepresentation of data, plagiarism, etc., to ensure academic integrity. • Realize that the environment and humans are dependent on one another and understand the responsible management of our ecosystem for survival and the well-being of future generations.
PO-5	Usage of ICT / Lifelong Learning / Self-Directed Learning • Inculcate the habit of learning continuously through the effective adoption of ICT to update knowledge in the emerging areas in sciences for inventions and discoveries, and to engage in remote or independent learning.
PO-6	Research-Related Skills • Develop a sense of inquiry and the capability to ask relevant and appropriate questions, recognize problems, synthesize and articulate ideas, identify cause-and-effect relationships, define problems, formulate hypotheses, test them, analyze and interpret data, and draw logical conclusions. • Acquire the ability to plan, execute, and report the results of an experiment or investigation.

Programme Specific Outcomes (PSO)

PSO No.	Upon completion of the B.Sc. Computer Science Degree programme, the graduates will be able to:	Mapping (PO)
PSO-1	Develop a comprehensive understanding of ethical considerations in programming, multimedia creation, animation, and networking across various computer languages.	1, 4, 5
PSO-2	Acquire foundational expertise in computer organization, digital circuits, and problem-solving techniques for real-world research challenges.	1, 2, 3, 6
PSO-3	Explore the software development lifecycle, rigorous testing methodologies, and adept document preparation to tackle challenges in scientific domains.	1, 3
PSO-4	Distinguish and explain data distribution concepts alongside networking to enhance individual or team capability in designing efficient systems for managing and communicating data.	2, 4
PSO-5	Develop proficiency in applying mathematical concepts in computing applications beyond web development through self-directed learning with diverse technologies.	1, 5

Semester - I	PROSE		24ULAR11			
LANG - I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 60	Marks :100	6	-	-	3

General Objective: To make the students to understand the structure of Arabic language and improve the reading and writing skills.

Learning Objectives

LO	The learners will be able to:
LO-1	Understand basic Arabic grammar.
LO-2	Understand the structure of Arabic language.
LO-3	Employ sentence making.
LO-4	Enhance vocabulary.
LO-5	Improve reading and writing skills.

- UNIT I - من الدرس الأول إلى الدرس الرابع
- UNIT II - من الدرس الخامس إلى الدرس الثامن
- UNIT III - من الدرس التاسع إلى الدرس الثالث عشر
- UNIT IV - من الدرس الرابع عشر إلى الدرس الثامن عشر
- UNIT V - من الدرس التاسع عشر إلى الدرس الثالث والعشرون

Textbooks:

- دروس اللغة العربية لغير الناطقين بها، الجزء الأول، الدكتور ف. عبد الرحيم. 1.

Reference Books:

1. معجم الكلمات الواردة في دروس اللغة العربية لغير الناطقين بها
2. مفتاح دروس اللغة العربية لغير الناطقين بها
3. القراءة الراشدة - للشيخ أبي الحسن علي الحسيني الندوي
4. القراءة المفيدة - للدكتور محمد يوسف كوكن العمري
5. منهج العربية - السيد النبي حيدرآبادي

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Understand the correct pronunciation of Arabic letters
CO-2	Apply the structure-based composition
CO-3	List out the new vocabulary in Arabic
CO-4	Evaluate and read the Arabic sentences without diacritical marks
CO-5	Able to create the simple sentences in Arabic without errors.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
I	24ULAR11	PROSE					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	3	1	2	3	2	3	2	2	2	2
CO-2	3	3	1	2	2	1	3	2	2	1	1
CO-3	3	3	1	2	1	3	3	2	2	2	2
CO-4	3	3	1	2	2	2	3	2	2	1	1
CO-5	3	3	1	2	2	3	3	2	2	1	1
Average	3	3	1	2	2	2.2	3	2	2	1.4	1.4

STRONG – 3, MEDIUM – 2 , LOW – 1

Prepared by :Dr. S.A.Mohamed Rafeek

Checked by: Dr. J. Ubaiyathulla

Head of the Department

Semester - I	பொதுத்தமிழ் - 1		24ULTA11			
LANG - I	தமிழ் இலக்கிய வரலாறு - 1		L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.

Learning Objectives:

LO	The learners will be able to:
LO - 1	தமிழ் இலக்கண, இலக்கியங்களை மாணவர்கள் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்.
LO - 2	சங்க இலக்கியத்தில் காணப்படும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.
LO - 3	அற இலக்கியங்களை அறியச் செய்து வாழ்வின் விழுமியங்களை பயிற்றுவித்தல்.
LO - 4	காப்பியங்களை அறிமுகம் செய்து அதன் வழி வாழ்வியலை புரியச் செய்தல்.
LO - 5	பக்தி இலக்கியங்களின் மூலம் பக்தியுணர்வை ஊட்டுதல்.

அலகு 1இலக்கணம்

- தொல்காப்பியம், இறையனார் களவியல் உரை, நம்பியகப் பொருள், புறப்பொருள் வெண்பா மாலை, நன்னூல், தண்டியலங்காரம், யாப்பருங்கலக்காரிகை - நூல்கள்
- மொழிப் பயிற்சி - ஒற்றுப்பிழை தவிர்த்தல்
 - வல்லினம் மிகும் இடங்கள்
 - வல்லினம் மிகா இடங்கள்
 - ஈரொற்று வரும் இடங்கள்
 - ஒரு, ஓர் வரும் இடங்கள்
 - அது, அஃது வரும் இடங்கள்
 - தான், தாம் வரும் இடங்கள்

- சங்க இலக்கியம் - எட்டுத் தொகை, பத்துப்பாட்டு.
- அற இலக்கியம் - பதினெண்கீழ்க்கணக்கு நூல்கள்.
- காப்பிய இலக்கியம் - ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்.

4. பக்தி இலக்கியமும் (பன்னிரு திருமுறைகள் நாலாயிர திவ்வியப் பிரபந்தம்), பகுத்தறிவு இலக்கியமும் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

அலகு 2 சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு எட்டுத்தொகை

- | | |
|---------------------------|---|
| 1. நற்றிணை | - முதல் பாடல் - நின்ற சொல்லர் |
| 2. குறுந்தொகை 3 ஆம் பாடல் | - நிலத்தினும் பெரிதே |
| 3. ஐங்குறுநூறு | - “நெல் பல பொலிக! பொன் பெரிது சிறக்க!”(முதல் பாடல்) வேட்கைப் பத்து. |
| 4. கலித்தொகை | - 51- சுடர்த்தொடிக் கேளாய் - குறிஞ்சிக் கலி. |
| 5. புறநானூறு | - 189 தெண்கடல் வளாகம் |

பொதுமையின்றி, நாடா கொன்றோ -187

பத்துப்பாட்டு

1. முல்லைப்பாட்டு (முழுவதும்)

அலகு 3 அற இலக்கியம் பதினெண்கீழ்க்கணக்கு நூல்கள்

- | | |
|-------------------|------------------------------|
| 1. திருக்குறள் | - அறன் வலியுறுத்தல் அதிகாரம் |
| 2. நாலடியார் | - பாடல் : 131 (குஞ்சியழகும்) |
| 3. நான்மணிக்கடிகை | - நிலத்துக்கு அணியென்ப |
| 4. பழமொழி நானூறு | - தம் நடை நோக்கர் |
| 5. இனியவை நாற்பது | - 37 இளமையை மூப்பு என்று |

அலகு4 காப்பிய இலக்கியம் (ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்)

- | | |
|------------------|-------------------------------|
| 1. சிலப்பதிகாரம் | - வழக்குரைகாதை |
| 2. மணிமேகலை | - பாத்திரம் பெற்ற காதை |
| 3. பெரியபுராணம் | - பூசலார் நாயனார் புராணம் |
| 4. கம்பராமாயணம் | - குகப் படலம் |
| 5. சீறாப்புராணம் | - மானுக்குப் பிணை நின்ற படலம் |
| 6. இயேசு காவியம் | - ஊதாரிப்பிள்ளை |

அலகு5 பக்தி இலக்கியமும், பகுத்தறிவு இலக்கியமும் (பக்தி இலக்கியம் பன்னிரு திருமுறைகள், நாலாயிர திவ்வியப் பிரபந்தம் - பகுத்தறிவு இலக்கியம் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

பக்தி இலக்கியம்:

1. திருநாவுக்கரசர் தேவாரம் - “நாமார்க்கும் குடியல்லோம்” எனத் தொடங்கும் பாடல் மட்டும்
2. மாணிக்கவாசகர் திருவாசகம் - “நமச்சிவாய வாழ்க நாதன் தாள் வாழ்க” முதல் “சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க” வரை.
3. பொய்கையாழ்வார் - வையந் தகளியா வார்கடலே
4. பூதத்தாழ்வார் - அன்பே தகளியா
5. பேயாழ்வார் - திருக்கண்டேன் பொன்மேனி கண்டேன்
6. ஆண்டாள் - திருப்பாவை மார்கழித் திங்கள் (முதல் பாடல்)

பகுத்தறிவு இலக்கியம்

1. திருமுலர் - திருமந்திரம் (270, 271, 274, 275 285)
பட்டினத்தார் திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல் பா.எண். 279, 280)
2. கடுவெளிச் சித்தர் - பாபஞ்செய் யாதிரு மனமே (பாடல் முழுவதும்)
3. இராவண காவியம் - தாய்மொழிப் படலம் - 18, ஏடுகையில்லா ரில்லை முதல்- 22 செந்தமிழ் வளர்த்தார் வரை.

பாட நூல்:

பதிப்பாசிரியர் முனைவர் ச.மகாதேவன், பொதுத்தமிழ் 1, சதக்கத்துல்லாஹ் அப்பா கல்லூரி வெளியீடு, 2024 – 2025(முதற் பதிப்பு).

பார்வை நூல்கள் :

1. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாதெமி, புதுடெல்லி.
2. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
4. தமிழ் இலக்கிய வரலாறு – முனைவர்.சிற்பி பாலசுப்ரமணியம், முனைவர்.சொ.சேதுபதி
5. புதிய தமிழ் இலக்கிய வரலாறு – முனைவர்.சிற்பி பாலசுப்ரமணியம், நீல.பத்மநாபன்
6. தமிழ் இலக்கிய வரலாறு - டாக்டர்.அ.கா.பெருமாள்
7. தமிழ் இலக்கிய வரலாறு - முனைவர். ப.ச.ஏசுதாசன்
8. தமிழ் இலக்கிய வரலாறு – ஸ்ரீகுமார்
9. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு – பாக்கியமேரி

10. தமிழ் பயிற்றும் முறை, பேராசிரியர் ந. சுப்புரெட்டியார் - மணிவாசகர் பதிப்பகம், சிதம்பரம்

- <https://www.chennaiilibrary.com/>
- <https://www.sirukathaigal.com>
- <https://www.tamilvirtualuniversity.org>
- <https://www.noolulagam.com>
- <https://www.katuraitamilblogspot.com>

Course Outcomes

CO	Upon completion of this course, students will be able to
CO-1	மொழியறிவோடு சிந்தனைத் திறனைப் பெறுவர்.
CO-2	சங்க இலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.
CO-3	அற இலக்கியம் தமிழ்க் காப்பியங்களின் வழி வாழ்வியல் சிந்தனையைப் பெறுவர்.
CO-4	பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினை அறிவர்.
CO-5	பகுத்தறிவு இலக்கியங்களைக் கற்பதன் வழி சமய நல்லிணக்கத்தைப் பின்பற்றுவர்.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
I	24ULTA11	தமிழ் இலக்கிய வரலாறு - 1					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	2	3	3	3	2	2	2	3	2	3
CO-2	3	3	2	2	2	3	2	3	3	2	2
CO-3	3	2	3	3	2	2	2	3	2	3	2
CO-4	-	3	3	2	2	2	3	2	3	2	2
CO-5	-	3	2	2	2	3	3	2	2	2	2
Average	3	2.6	2.6	2.4	2.2	2.4	2.4	2.4	2.6	2.2	2.2

3 – STRONG, 2 – MEDIUM, 1- LOW

Prepared by :Dr. A.S. Shaik Sindha

Checked by: Dr.S.Mahadevan
Head of the Department

Semester - I	General English - 1		24ULEN11			
LANG- II			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

To train learners to communicate effectively, think critically, and express themselves creatively.

Learning Objectives (LO)

LO	The learners will be able to :
LO – 1	Acquire self-awareness and develop positive thinking which are required in various situations.
LO – 2	Develop the attribute of empathy
LO – 3	Acquire creative and critical thinking skills
LO – 4	Learn the basics of grammar
LO – 5	Develop Listening, Speaking, Reading and Writing (LSRW) skills

Unit - I

The Skill-focused: Self-Awareness and Positive Thinking

Autobiography

1. *I am Malala* (Chapter 1) by Malala Yousafzai.
2. *The Story of My Experiments with Truth* (Chapters 1, 2 and 3) by M.K.Gandhi.

Poetry

1. “Where the Mind is Without Fear” (*Gitanjali*, Verse – 35) by Rabindranath Tagore
2. “Love Cycle by Chinua Achebe”

Unit – II

The Skill Focused: Empathy

Poetry

1. “Nine Gold Medals” – David Roth
2. “Alice Fell or Poverty” – William Wordsworth

Short Story

1. The School for Sympathy – E.V. Lucas
2. Barn Burning – William Faulkner

Unit – III

The Skills Focused: Critical and Creative Thinking

Poetry

1. “The Things That Haven’t Been Done Before” – Edgar Guest
2. “Stopping by the Woods on a Snowy Evening” – Robert Frost

Readers Theatre

1. The Magic Brocade – A Tale of China
2. “Three Sideway Stories from Wayside School” by Louis Sachar adapted from the book *Stories on Stage* by Aaron Shepard.

Unit – IV

Parts of Speech

1. Articles
2. Noun
3. Pronoun
4. Verb
5. Adverb
6. Adjective
7. Preposition

Unit – V

Paragraph and Essay Writing

1. Descriptive
2. Expository
3. Persuasive
4. Narrative

Reading Comprehension

Types of Reading: Extensive and Intensive Reading

Vocabulary Building

Critical text analysis

Deep reading (Pages 72 to 84 from TANSCHS Syllabus - 2022)

Textbooks

1. Malala Yousafzai. *I am Malala*, Little, Brown and Company, 2013.
2. M.K. Gandhi. *An Autobiography or The Story of My Experiments with Truth* (Chapter – I), Rupa Publications, 2011.
3. Rabindranath Tagore. "Gitanjali 35" from *Gitanjali* (Song Offerings): A Collection of Prose Translations made by the Author from the Original Bengali. Mac Millan, 1913.
4. N. Krishnasamy, *Modern English: A Book of Grammar, Usage and Composition*, Macmillan, 1975.
5. Aaron Shepard. *Stories on Stage*, Shepard Publications, 2017.
6. J.C. Nesfield. *English Grammar, Composition and Usage*, Macmillan, 2019.

Web Sources

1. Malala Yousafzai. I am Malala (Chapter 1)
<https://archive.org/details/i-am-malala>.
2. M.K Gandhi. An Autobiography or The Story of My Experiments with Truth (Chapter-1)-Rupa Publication, 2011.
<https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx>
3. Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings)
<https://www.poetryfoundation.org/poems/45668/gitanjali-35>
4. Aaron Shepard. Stories on Stage, Shepard Publications, 2017.
<https://amzn.eu/d/9rVzlNv>
5. J C Nesfield. Manual of English Grammar and Composition. <https://archive.org/details/in.ernet.dli.2015.44179>

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Understand self- awareness and positive thinking required in various life situations
CO-2	Acquire the attribute of empathy.
CO-3	Develop creative and critical thinking abilities.
CO-4	Explain basic grammar, develop and integrate the use of four language skills (LSRW)
CO-5	Compose original poems and personal narratives.

Relationship Matrix

Semester	Course Code			Title of the Course			Hours		Credits		
I	24ULEN11			General English 1			90		3		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	1	2	3	3	3	3	3	3
CO2	3	3	3	1	2	3	3	3	3	1	1
CO3	3	3	1	3	3	2	3	3	3	1	1
CO4	3	3	1	2	1	3	3	3	3	3	3
CO5	3	3	3	3	3	2	3	3	3	3	3
Average	3	3	2.2	2	2.2	2.6	3	3	3	2.2	2.2

STRONG – 3, MEDIUM – 2 AND LOW - 1

Prepared by: Dr.L.Faustina Leo

Checked by

Dr.S.Mohamed Haneef

Head of the Department

SEMESTER I

Semester-I	PROGRAMMING IN C AND DATA STRUCTURES		24UCAS11			
Core-I			L	T	P	C
Hrs./Week:5	Hrs./Semester:75	Marks:100	5	-	-	5

General Objective

To provide a solid foundation in the C programming language by introducing fundamental programming constructs, control structures, data handling, and problem-solving techniques. The course aims to equip students with the skills to write efficient, structured, and maintainable C programs.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand the history, structure, and essential syntax of C programs, including data types, variables, constants, operators, and expressions.
LO-2	Apply control statements and looping structures effectively for decision-making and iterative operations in problem-solving.
LO-3	Gain proficiency in using arrays, strings, and functions — including recursion — for modular program design.
LO-4	Develop the ability to use pointers and structures for dynamic data handling, memory management, and complex data representation.
LO-5	Acquire practical experience in file handling, string processing, and fundamental data structures like stacks, queues, and linked lists.

UNIT I Basics of C

History of C and its importance – Structure of a C program – Data Types – Constants and Variables – Operators and Expressions – Order of Precedence, Evaluating of Arithmetic Expressions – Type Conversion- Decision Statements: if, if-else, and nested if statements.

UNIT II Loops and Functions

For Loop, While, Do-while loop – Arrays: - One Dimensional Array, Two-dimensional Arrays, Character Arrays and Strings – Functions: Function with arrays- Function with decision and looping statements - Recursion.

UNIT III Pointers and Structures

Introduction – Pointer Expressions – Chain of Pointers Pointers and Arrays – Array of Pointers – Pointers as function arguments – Functions returning Pointers – Pointers to Functions – Function pointer – Structures - declaration, initialization, Array of Structures – Pointer to structures, Structures and functions – Typed of Enumerated data types, Unions.

UNIT IV Strings and Files

Strings Processing, Standard string library functions – Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to an existing file – File IO – Reading and writing structures.

UNIT V Data Structures

LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linked List: concepts, operations – Doubly Linked List: concepts, operations – Trees: General trees, Binary trees.

TEXT BOOKS:

1. E. Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, New Delhi, Ninth Edition, 2024.
2. Yashavant Kanetkar, Data Structures Through C: Learn the fundamentals of Data Structures through C - 5th Edition, bpb publication, 2023.

REFERENCE BOOKS:

1. Reema Thareja, “Data Structures Using C”, Oxford University Press, 3rd Edition 2022
2. Yashavant Kanetkar, “Let us C”, BPB Publications, Twentieth Edition, New Delhi, 2024.
3. Szuhay, Jeff, and Szuhay, Jeff, “Learn C Programming: A Beginner's Guide to Learning C Programming the Easy and Disciplined Way”, Packt Publishing, 2020.

4. Jena, Sisir Kumar, and Jena, Sisir Kumar, "C Programming: Learn to Code", CRC Press, 2021.
5. <https://www.tutorialspoint.com/cprogramming/index.htm>
6. <https://www.w3schools.in/data-structures/intro>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the structure, syntax, and fundamental concepts of the C programming language.
CO-2	Apply control and looping statements to design logical and structured programs.
CO-3	Implement functions, arrays, and recursion for modular programming.
CO-4	Utilize pointers, structures, and unions for efficient memory and data management.
CO-5	Demonstrate file handling, string operations, and basic data structure implementations like stacks, queues, and linked lists.

Relationship Matrix:

Semester	Course Code			Title of the Course				Hours		Credits	
I	24UCAS11			PROGRAMMING IN C AND DATA STRUCTURES				75		5	
Course Outcome s (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	2	2	2	3	2	1	2
CO-3	2	3	2	2	2	2	2	3	3	1	3
CO-4	2	3	2	2	2	3	2	3	3	2	3
CO-5	2	3	2	2	3	3	2	3	2	3	3
Average	2.2	2.8	1.8	1.6	2.2	2.2	2.2	2.8	2.2	1.6	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. M.Nagoor Meeral

Checked by: Dr.V.Roseline

Head of the Department

Semester-I	PROGRAMMING IN C LAB		24UCAS1P			
Core-IP			L	T	P	C
Hrs./Week:3	Hrs./Semester:45	Marks:100	3	-	3	-

General Objective

To develop fundamental programming skills using the C language through hands-on problem-solving exercises. The course enables students to understand programming logic, decision making, loops, functions, pointers, and data structures by implementing real-world inspired mini applications.

Learning Objectives

LO No.	The learners will be able to
LO-1	Develop simple programs using basic syntax, decision-making, and looping constructs.
LO-2	Apply modular programming concepts through functions, recursion, and parameter passing methods.
LO-3	Implement array, string, and pointer-based operations for data manipulation.
LO-4	Demonstrate file operations and structured data handling techniques.
LO-5	Construct simple data structures such as stacks and queues using linked lists.

1. Write a Program using Basics & Decision Making Statements

(i) Smart Thermostat – Convert temperature from degree Centigrade to Fahrenheit.

(ii) Number Classifier – Determine whether a given number is Even or Odd.

(iii) Decision Maker – Find the greatest among three numbers.

2. Write a Program using Loops

(i) Data Logger – Display first 10 sensor readings (natural numbers) and calculate their sum.

(ii) Data Reverser – Reverse a numeric ID (without using pointers).

3. Write a Program using Switch Statements

- (i) Day Predictor – Display the day of the week (Monday to Sunday) based on a number input.
- (ii) Math Operation Assistant– Perform addition, subtraction, multiplication, and division based on user choice.
- 4. Write a Program using Arrays
 - (i) Weather Data Matrix– Perform multiplication of two matrices.
 - (ii) Sensor Peak Finder– Find the maximum element in an array (without using pointers).
- 5. Write a Program using Strings
 - (i) Palindrome Checker – Check whether a given string is a palindrome (without using library functions).
 - (ii) Word Counter – Count the number of words in a string (words separated by spaces).
- 6. Write a Program using Functions
 - (i) Prime Number Checker – Check whether a number is prime using functions
- 7. Write a Program using Recursion
 - (i) Recursive Factorial Calculator– Find the factorial of a number using recursion.
- 8. Write a Program using Call by Value and Call by Reference
 - (i) Data Swapper Bot – Swap two numbers demonstrating both call types.
- 9. Write a Program using Pointers
 - (i) Pointer-Based Value Doubler - Double the value of each element in an array using pointers.
 - (ii) Pointer-Based Sum of Digits - Calculate the sum of its digits using pointers.
- 10. Write a Program using File Handling
 - (i) Student Dataset Creator– Create a file containing student details.
 - (ii) Text File Analyzer– Count lines, words, and characters in a file.
- 11. Write a Program using Data Structures
 - (i) Stack Manager – Implement a stack using singly linked list.
 - (ii) Queue Manager – Implement a queue using linked list.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Write and execute C programs using control structures and loops.
CO-2	Apply arrays, strings, and functions to solve computational problems.
CO-3	Implement pointer operations and recursive functions efficiently.
CO-4	Perform file operations and manage text/data files programmatically.
CO-5	Construct and manipulate simple data structures like stacks and queues.

Relationship Matrix:

Semester	Course Code			Title of the Course				Hours	Credit		
I	24UCAS1P			PROGRAMMING IN C LAB				45	3		
Course Outcome s (COs)	ProgrammeOutcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	2	2	2	3	2	1	2
CO-3	2	3	2	2	2	2	2	3	3	1	3
CO-4	2	3	2	2	2	3	2	3	3	2	3
CO-5	2	3	2	2	3	3	2	3	2	3	3
Average	2.2	2.8	1.8	1.6	2.2	2.2	2.2	2.8	2.2	1.6	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-I	ALGEBRA AND CALCULUS		24UAMA15			
EC-I (Allied)			L	T	P	C
Hrs./Week:6	Hrs./Semester:90	Marks:100	6	-	-	5

General Objective:

- To provide students with a comprehensive understanding of fundamental concepts in algebraic equations
- To provide students with the skills to apply integration and differentiation to solve problems

Learning Objectives (LO)

LO	The learners will be able to :
LO – 1	Enable students to understand the techniques for solving algebraic equations
LO – 2	Interpret the inverse of a non singular matrix and rank of a matrix to determine the consistency of equations
LO – 3	Develop their knowledge in matrices and apply Cayley Hamilton theorem to determine the characteristic polynomial and compute the eigen values
LO – 4	Evaluate definite integrals by using integration by parts and fourier series
LO – 5	Determine the type of linear differential equation

UNIT I Theory of Equations

Relation between roots & coefficients – Transformations of Equations – Diminishing ,Increasing& multiplying the roots by a constant- Forming equations with the given roots – Descarte’s rule of Signs(statement only) – simple problems.

UNIT II Matrices

Singular matrices – Inverse of a non-singular matrix using adjoint method - Rank of a Matrix – Consistency .

UNIT III Matrices

Characteristic equation, Eigen values, Eigen vectors – Cayley Hamilton’s Theorem (proof not needed) –Simple applications only.

UNIT IV Integration

Integration: Properties of definite integrals –Evaluation using Integration by parts- Fourier Series in the range $(0, 2\pi)$ – Odd & Even Functions.

UNIT V Differential Equations

Linear equations - Second order of types $(aD^2 + bD + c)y = F(x)$ where a, b, c are constants and $F(x)$ is one of the following types (i) e^{kx} (ii) $\sin kx$ or $\cos kx$ (iii) x^n , n being an integer (iv) $e^{kx} f(x)$.

TEXT BOOKS:

1. S.G. Venkatachalapathy, Allied Mathematics, Margham Publications, Chennai-17, 2013.
2. S. Arumugam and A.Thangapandi Isaac, Differential Equations and Applications, New Gamma Publishing House, Palayamkottai, 2020.
Unit I : TB 1 - Chapter 5 (Section 5.8, 5.33-5.42)
Unit II: TB 1 - Chapter 6 (Section 6.6 - 6.33)
Unit III: TB 1 - Chapter 6 (Section 6.36-6.37)
Unit IV: TB 1 - Chapter 10 (Section 10.99-10.116), Chapter 12 (Section 12.1-12.23)
Unit V: TB 2 - Chapter 1 (Section 1.1), Chapter 2 (Section 2.1, 2.2, 2.3)

REFERENCE BOOKS:

1. T.K. Manickavasagam Pillai & others, Algebra, Volume I, S.V Publications, 2014.
2. S. Narayanan, T.K. Manicavachagam Pillai, Calculus, Vol. II, S. Viswanathan Pvt Limited, 2009.
3. M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2014.

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Demonstrate a clear understanding of the properties and characteristics of different types of equations.
CO-2	Analyze the inverse of a non singular matrix and rank of a matrix to check the consistency of equations
CO-3	Determine eigen vectors and eigen values using Cayley Hamilton theorem
CO-4	Determine the definite integrals by integration by parts and to find the Fourier series.
CO-5	Evaluate the solution of the linear differential equation of the form e^{kx} , $\sin kx$ or $\cos kx$, x^n , n being an integer and $e^{kx} f(x)$.

Relationship Matrix

Semester	Course Code		Title of the Course				Hours		Credits		
I	24UAMA15		Algebra and Calculus				90		5		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	2	3	3	3	-	3	3	-
CO2	2	3	2	3	1	1	3	-	3	3	-
CO3	3	2	3	2	3	2	3	-	3	3	-
CO4	2	1	3	3	2	3	3	-	3	3	-
CO5	3	3	1	1	3	2	3	-	3	3	-
Average	2.6	2.2	2.5	2.2	2.4	2.2	3		3	3	

STRONG – 3, MEDIUM – 2 AND LOW - 1

Semester-I	FOUNDATIONS OF ARTIFICIAL INTELLIGENCE		24UNAS11			
SEC-I			L	T	P	C
Hrs./Week:2	Hrs./Semester:30	Marks:50	2	-	-	2

General Objective

To introduce the fundamental concepts, history, and scope of Artificial Intelligence (AI), and to help students understand how AI systems work, where they are applied, and what ethical and social challenges they bring. The course aims to develop an informed understanding of AI's real-world impact and its potential for future innovation.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand the definition, origin, evolution, and classification of Artificial Intelligence, distinguishing it from human intelligence.
LO-2	Explain the significance of data and algorithms in AI systems, and differentiate between machine learning, deep learning, and traditional programming.
LO-3	Identify and analyze real-world applications of AI in everyday life, understanding both their benefits and potential risks.
LO-4	Explore how AI is transforming specialized sectors such as healthcare, education, agriculture, robotics, and creative industries.
LO-5	Evaluate ethical, legal, and societal implications of AI, and discuss future trends and responsible uses of AI for social good.

UNIT I Introduction to Artificial Intelligence

What is Artificial Intelligence?-Brief History and Evolution of AI- Human vs. Artificial Intelligence-Types of AI- Myths and Hype Around AI

UNIT II Data and Algorithms in AI

Role of Data in AI-Structured vs. Unstructured Data-Data Collection and Ethics-Introduction to Algorithms in AI-Machine Learning vs. Traditional Programming-Basics of Neural Networks and Deep Learning

UNIT III Applications of AI in Everyday Life

AI in Mobile Apps and Web Services - AI in Customer Support and Recommendations - AI in Transportation (Self-driving cars, Navigation) -AI in Personal Devices (Smart Assistants, Smart Homes)- Chatbots and Language Processing -Risks and Failures of AI in Real Life

UNIT IV AI in Specialized Fields

AI in Healthcare (Diagnosis, Monitoring, Surgery)-AI in Education and Accessibility-AI in Agriculture and Environment -AI in Robotics and Drones -AI and Creative Fields (Art, Music, Writing) -Limitations and Nonstarter Applications

UNIT V The Future of AI and Ethical Considerations

The Future of Work and AI-AI in Space and Scientific Exploration - Human-AI Collaboration -AI and Privacy, Bias, and Security -Ethical and Legal Issues in AI -AI for Good: Socially Responsible Applications

TEXTBOOK:

Chakraborty, Utpal. "*Artificial Intelligence for All*", BPB Publications, 2020.

REFERENCE BOOKS:

Artificial Intelligence Foundations, Andrew Lowe, Steve Lawless, February 2021, Publisher(s): BCS, The Chartered Institute for IT. ISBN: 9781780175300.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamental concepts, evolution, and types of Artificial Intelligence.
CO-2	Explain the importance of data, algorithms, and neural networks in AI systems.
CO-3	Analyze how AI is applied in everyday life, identifying its advantages and limitations.
CO-4	Evaluate the use of AI in specialized sectors and discuss its potential impacts.
CO-5	Assess ethical, societal, and future challenges of AI and propose responsible AI solutions.

Relationship Matrix:

Semester	Course Code		Title of the Course				Hours	Credits			
I	24UNAS11		FOUNDATIONS OF ARTIFICIAL INTELLIGENCE				30	2			
Course Outcome s (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	2	1	1	2
CO-2	2	3	2	1	3	2	2	3	2	2	3
CO-3	2	3	3	2	2	3	2	3	3	2	3
CO-4	2	3	2	3	2	3	2	3	3	3	3
CO-5	2	2	3	3	3	3	2	2	2	3	3
Average	2.2	2.6	2.2	2	2.4	2.6	2.6	2.2	2.6	2.2	2.8

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Mr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-I	WEB TECHNOLOGY		24UFAS11			
FC			L	T	P	C
Hrs./Week:2	Hrs./Semester:30	Marks:50	2	-	-	2

General Objective

To introduce the fundamental concepts of web development using HTML, CSS, JavaScript, PHP, and MySQL, and to enable students to understand how modern web applications are designed, developed, and deployed. The course aims to develop practical skills in building interactive, dynamic, and database-driven web applications while understanding the structure and functionality of the web ecosystem.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand the fundamental concepts of web development, including HTML structure, elements, tags, and webpage design principles, and distinguish static web pages from dynamic web pages.
LO-2	Explain the role of CSS and JavaScript in enhancing web page presentation and interactivity, and apply basic scripting concepts such as variables, functions, arrays, and events.
LO-3	Develop dynamic web pages using JavaScript by implementing validation techniques, user interaction features, and visual effects such as rollovers and animations.
LO-4	Build server-side applications using PHP by understanding syntax, control structures, functions, and data handling between web pages.
LO-5	Design and implement database-driven web applications by integrating PHP with MySQL for storing, retrieving, and managing dynamic data efficiently.

UNIT I Fundamentals of HTML

BasicHTML, TheDocument body, Text, Hyperlinks, Adding more formatting, Lists, Tables, Using colors and images, Images, Multimedia objects, Frames, Forms.

UNIT II Cascading Style Sheets & Client-Side Scripting

Introduction, Using styles: Simple examples, Defining your own styles, Properties and values in styles. Client Side Scripting: JavaScript: JavaScript—The basics, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Functions- Dataand objects in java script, Regularexpressions, Exception Handling, Built in objects,Events.

UNIT III Dynamic HTML with JavaScript

Dynamic HTML with JavaScript: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Moving images, multiple pages in a single download, A text-only menu system, Floating logos.

UNIT IV Server-Side Scripting with PHP

Server Side Scripting: PHP: evolution of PHP– structure and syntax of PHP and integrating the same with HTML – comments – variables – data types – operators – control structures–passing information between pages–Strings–Arrays and Functions.

UNIT V Database Integration with PHP and MySQL

Integration of Apache, MySQL, PHP to design dynamic webpages: MySQL functions in PHP – Connecting and disconnecting from MySQL – Using tables – form design–editing the database.

TEXT BOOKS:

1. Craig Grannell, Victor Sumner, Dionysios Synodinos, “The Essential Guide to HTML5 and CSS3 Web Design”, Apress, 2012, ISBN: 9781430237877.
2. Laurence Lars Svekis, Maaike van Putten, Codestars By Rob Percival, “JavaScript from Beginner to Professional”, Packt Publishing, 2021, ISBN: 9781800566774.
3. Jon Duckett, “PHP & MySQL: Server-side Web Development”, Wiley, 2022, ISBN: 9781119149224.
4. Robin Nixon, “Learning PHP, MySQL & JavaScript: A Step-by-Step Guide to Creating Dynamic Websites”, O'Reilly Media, 2021, ISBN: 9781492093824.

REFERENCE BOOKS:

1. Chris Bates, “Web Programming Building Internet Applications”, Third Edition, Wiley, 2007, ISBN-10:0470017759
2. Timothy Boronczyk, Michael, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass “Beginning PHP 6, Apache, MySQL Web Development”, Wiley Publishing, 2009 Edition. ISBN-13: 9788126521227.
3. Robin Nixon, “Learning PHP, MySQL & JavaScript With jQuery, CSS & HTML5” O'Reilly Media, Fourth edition, December 2014, ISBN: 978-1-49191866-1.
4. Rochkind, Marc. Expert PHP and MySQL: Application Design and Development. Netherlands, Apress, 2013.
5. Lockhart, Josh. Modern PHP: New Features and Good Practices, O'Reilly Media, 2015.

Web Link:

1. https://onlinecourses.swayam2.ac.in/nou25_cs23/preview
2. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamentals of HTML, formatting tags, forms, tables, multimedia, and webpage structures.
CO-2	Apply CSS and JavaScript concepts to create interactive and responsive web pages.
CO-3	Analyze and implement Dynamic HTML features and client-side validation techniques.
CO-4	Develop server-side web applications using PHP with control structures, arrays, and functions.
CO-5	Design and integrate dynamic database-driven web applications using PHP and MySQL.

Relationship Matrix:

Semester	Course Code			Title of the Course				Hours	Credits		
I	24UFAS11			WEB TECHNOLOGY				30	2		
Course Outcome s (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	3	2	2	3	2	1	3
CO-3	2	3	3	2	2	2	2	3	3	2	2
CO-4	2	3	2	2	3	3	2	3	3	3	2
CO-5	2	3	3	2	3	3	2	3	3	3	3
Average	2.2	2.8	2.2	1.6	2.6	2.2	2.2	2.8	2.4	2	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester – II	GRAMMAR		24ULAR21			
LANG – I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective: To make the students to develop the skill of basic Arabic Grammar and Translation skills from Arabic to English vice-versa.

Learning Objectives

LO	The learners will be able to:
LO 1	Understand basic Arabic grammar.
LO 2	Understand the correct usage of Arabic grammar.
LO 3	Employ sentence making.
LO 4	Enhance vocabulary.
LO 5	Improve reading and writing skills.

UNIT I -Lessons 1 to 4 (Text Book – 1) من الدرس الأول إلى الدرس الرابع

UNIT II - Lessons 5 to 8 (Text Book – 1) من الدرس الخامس إلى الدرس الثامن

UNIT III – Lessons 9 to 12 (Text Book – 1) من الدرس التاسع إلى الدرس الثاني عشر

UNIT IV – Lessons 13 to 16 (Text Book – 1) من الدرس الثالث عشر إلى الدرس السادس عشر

UNIT V – Lessons 17 to 20 (Text Book – 1) من الدرس السابع عشر إلى الدرس العشرون

Textbooks:

1. قواعد اللغة العربية الأساسية، الدكتور سيد رحمة الله، رئيس سابق لقسم اللغة العربية، الكلية الجديدة، شنائي

Basic Arabic Grammar, By Dr. Syed Rahmathullah

Reference Books:

النحو الواضح – علي الجارم ومصطفى أمين
 دليل النحو الواضح – الدكتور بشير أحمد جمالي
 سهل العوامل – الدكتور تاج الدين المناني
 النحو الميسر للكبار والصغار – علي محمود عقيلي
 القواعد التطبيقية في اللغة العربية – الدكتور نديم دكور

www.alnahw.com

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Able to use basic grammatical structure.
CO-2	Develop reading skills and reading speed
CO-3	Acquire new vocabulary in Arabic
CO-4	Understand the different types of sentences.
CO-5	Able to construct simple sentences in Arabic

Relationship Matrix

Semester	Course Code	Title of the Course					Hours		Credits		
II	24ULAR21	GRAMMAR					90		3		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	3	2	3	2	2	3	2	2	2	1
CO-2	3	3	2	3	1	3	2	2	2	3	1
CO-3	3	3	2	2	2	1	3	3	3	2	2
CO-4	3	3	2	3	3	2	3	3	2	3	3
CO-5	3	3	2	2	3	2	2	2	1	2	3
Average	3	3	2	2.6	2.2	2	2.6	2.4	2	2.4	2

STRONG – 3, MEDIUM – 2, LOW – 1

Prepared by: Dr. J. Ubaiyathulla

Checked by: Dr. J. Ubaiyathulla
Head of the Department

Semester – II	பொதுத்தமிழ் - 2		24ULTA21			
LANG – I	தமிழ் இலக்கிய வரலாறு – 2		L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

- தமிழ் இலக்கியப் போக்குகளையும் இலக்கணங்களையும் மாணவர் .
- அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல்.
- நடைமுறைகளை மேற்கொள்ளுதல்

Learning Objectives:

LO	The Learners will be able to:
LO – 1	சிற்றிலக்கியங்களின் வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுதல்
LO – 2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்
LO – 3	திராவிட இயக்க இலக்கியங்களைக் கற்பதன் மூலம் மொழி உணர்வு , இன உணர்வு, சமத்துவம் சார்ந்த சிந்தனைகளை ஊட்டுதல்
LO – 4	தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்
LO – 5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் மேடைப்பேச்சு மற்றும் கட்டுரை, கதை எழுதுவதற்கு பயிற்சி பெறுதல்.

அலகு1 தமிழ் இலக்கிய வரலாறு அறிமுகம்

1. சிற்றிலக்கியம் குறவஞ்சி, கலம்பகம், உலா, பரணி, பள்ளு, பிள்ளைத்தமிழ்,தூது, அந்தாதி.
2. தனிப்பாடல் அறிமுகம்.
3. இக்கால இலக்கியம், கவிதை, சிறுகதை, நாடகம், உரைநடை , திராவிட இயக்கம் வளர்த்த தமிழ்

அலகு2சிற்றிலக்கியமும் தனிப்பாடலும்

சிற்றிலக்கியம்

1. கலிங்கத்துப் பரணி- விருந்தினரும் வறியவரு நெருங்கி யுண்ணரும் - முதல் - கேட்பாரைக் காண்மின் காண்மின் வரை.
2. திருக்குற்றாலக் குறவஞ்சி – வானரங்கள் கனிகொடுத்து.
3. முக்கூடற் பள்ளு – ஆற்று வெள்ளம் நாளை வரத்.

4. அபிராமி அந்தாதி- கலையாத கல்வியும் குறையாத வயதும் (பதினாறு செல்வங்கள்).
5. திருவரங்கக் கலம்பகம் — மறம் -பிள்ளைப் பெருமாள் ஐயங்கார்- பேசுவந்த தூத செல்லரித்த ஓலை செல்லுமொ.
6. தமிழ்விடு தூது முதல் பத்து கண்ணிகள்

தனிப்பாடல்

1. வான்குரவியின் கூடு — ஓளவையார்
2. ஆமணக்குக்கும் யானைக்கும் சிலேடை — முத்திருக்கும் கொம்பசைக்கும் முரித்தண்டே — காளமேகப் புலவர்
3. இம்பர் வான் எல்லை இராமனையே பாடி — வீரராகவர்
4. நாராய் நாராய் - சத்தி முத்தப் புலவர்

அலகு 3 இக்கால இலக்கியம் - 1

1. பாரதியார் - பாரத சமுதாயம் வாழ்கவே
2. பாரதிதாசன் - சிறுத்தையே வெளியில் வா
3. நாமக்கல் கவிஞர்- கத்தியின்றி
4. தமிழ் ஒளி — மீன்கள் (அந்தி நிலா பார்க்க வா)
5. ஈரோடு தமிழன்பன் — எட்டாவது சீர் (வணக்கம் வள்ளுவ)

சிறுகதைகள்

1. புதமைப்பித்தன் - கடிதம்
2. ஜெயகாந்தன் - வாய்ச் சொற்கள் (மாலை மயக்கம் - தொகுப்பு)
3. ஆர். சூடாமணி - அந்நியர்கள்

உரைநடை

1. மு வ கடிதங்கள் - தம்பிக்கு நூலில் முதல் இரண்டு கடிதங்கள்

அலகு 4 இக்கால இலக்கியம் - 2

1. தந்தை பெரியார் — திருக்குறள்(மாநாட்டு) உரை
2. பேரறிஞர் அண்ணா— இரண்டாம் உலகத் தமிழ் மாநாட்டு உரை
3. கலைஞர் மு. கருணாநிதி — தொல்காப்பிய பூங்கா —எழுத்து —முதல் நூற்பா கட்டுரை

நாடகம் - திரைத்தமிழ்

1. வேலைக்காரி—திரைப்படம்
2. ராஜா ராணி -சாக்ரடீஸ் -ஓரங்க நாடகம்

இதழியல் தமிழ்:

முரசொலி கடிதம்

1. செம்மொழி வரலாற்றில் சில செப்பேடுகள்

அலகு 5மொழிப் பயிற்சி

சொல் வேறுபாடு / பிழை தவிர்த்தல்

ரகர- றகர வேறுபாடுகள்

நகர- ணகர - னகர வேறுபாடுகள்

லகர- ளகர - ழகர வேறுபாடுகள்

பாட நூல்:

பதிப்பாசிரியர் முனைவர் ச.மகாதேவன், பொதுத்தமிழ் 2,

சதக்கத்துல்லாஹ் அப்பா கல்லூரி வெளியீடு 2024 - 2025(முதற் பதிப்பு).

பார்வை நூல்கள் :

1. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாதெமி,

புதடெல்லி.

2. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக

நிலையம், மதுரை.

3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி

புத்தக நிலையம், மதுரை.

4. தமிழ் இலக்கிய வரலாறு - முனைவர்.சிற்பி பாலசுப்ரமணியம்,

முனைவர்.சொ.சேதுபதி

5. புதிய தமிழ் இலக்கிய வரலாறு - முனைவர்.சிற்பி பாலசுப்ரமணியம்,

நீல.பத்மநாபன்

6. தமிழ் இலக்கிய வரலாறு - டாக்டர்.அ.கா.பெருமாள்

7. தமிழ் இலக்கிய வரலாறு -முனைவர். ப.ச.ஏசுதாசன்

8. தமிழ் இலக்கிய வரலாறு - ஸ்ரீகுமார்

9. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - பாக்கியமேரி.

10. தமிழ் பயிற்றும் முறை, பேராசிரியர் ந. சுப்புரெட்டியார் - மணிவாசகர் பதிப்பகம், சிதம்பரம்

- <https://www.chennaiLibrary.com/>
- <https://www.sirukathaigal.com>
- <https://www.tamilvirtualuniversity.org>
- <https://www.noolulagam.com>
- <https://www.katuraitamilblogspot.com>

Course Outcomes

CO	Upon completion of this course, students will be able to
CO-1	சிற்றிலக்கியங்களின்வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்
CO-2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்
CO-3	திராவிட இயக்க இலக்கியங்களைக் கற்பதன் மூலம் மொழி உணர்வு, இன உணர்வு, சமத்துவம் சார்ந்த சிந்தனைகளைப் பெறுவர்
CO-4	தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்வர்
CO-5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் மேடைப்பேச்சு மற்றும் கட்டுரை, கதை எழுதுவதற்கு பயிற்சி பெறுவர் பயிற்சி பெறுவர்.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
II	24ULTA21	தமிழ் இலக்கிய வரலாறு – 2						90	3		
Course Outcomes (Cos)	Programme Outcomes (Pos)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	2	3	3	3	2	2	2	3	2	3
CO-2	3	3	2	2	2	3	2	3	3	2	2
CO-3	3	2	3	3	2	2	2	3	2	3	3
CO-4	3	3	3	2	2	2	3	2	3	2	2
CO-5	3	3	2	2	2	3	3	2	2	2	2
Average	3	2.6	2.6	2.4	2.2	2.4	2.4	2.4	2.6	2.2	2.4

3 - STRONG, 2 - MEDIUM, 1- LOW

Prepared by :Dr. A.S. Shaik Sindha

Checked by: Dr.S.Mahadevan

Head of the Department

Semester - II	General English-II		24ULEN21			
LANG – II			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

To teach the four skills viz. Listening, Speaking, Reading and Writing to train the students the skills necessary for social and academic interactions.

Learning Objectives (LO)

LO	The learners will be able to:
LO-1	To make students realize the importance of resilience
LO-2	To enable them to become good decision makers
LO-3	To enable them to develop problem-solving skills
LO-4	To enable them to use tenses appropriately
LO-5	To help them use English effectively at workplace.

Unit – I

The Skill Focussed: Resilience

Poetry

1. “Don’t Quit” – Edgar A. Guest
2. “Still Here” – Langston Hughes

Short Story

- 3 Engine Trouble – R.K. Narayan
- 4 Rip Van Winkle – Washington Irving

Unit – II

The Skill Focussed: Decision Making

Short Story

1. The Scribe – Kristin Hunter
2. The Lady or the Tiger - Frank Stockton

Poetry

3. “The Road not Taken” – Robert Frost
4. “Snake” – D. H Lawrence

Unit – III

The Skill Focussed: Problem Solving

Autobiography

1. How I taught My Grandmother to Read – Sudha Murthy
2. How Frog Went to Heaven – A Tale of Angolo
3. Wings of Fire (Chapters 1,2,3) by A.P.J Abdul Kalam

Unit – IV

Grammar

Tenses

1. Present
2. Past
3. Future
4. Concord

Unit - V

English in the Workplace

- 1.e-mail – Invitation, Enquiry, Seeking Clarification
2. Circular
3. Memo
4. Minutes of the Meeting

Textbook:

1. Board of Editors. General English – II. Tamil Nadu State Council for Higher Education (TANSCH). Chennai: 2024.

Reference Books:

1. Martin Hewings, *Advanced English Grammar*, Cambridge University Press, 2000.
2. SP Bakshi, Richa Sharma, *Descriptive English*, Arihant Publications (India) Ltd., 2019.
3. Sheena Cameron, Louise Dempsey, *The Reading Book: A Complete Guide to Teaching Reading*, S&L. Publishing, 2019.
4. Barbara Sherman, *Skimming and Scanning Techniques*, Liberty University Press, 2014.
5. ShaikhMoula, *Communication Skills: A Practical Approach*.
6. Ramendra Kumar, *Stories of Resilience*, Blue Rose Publications, 2020.

Course Outcomes

CO	Upon completion of this course, students will be able to
CO-1	Understand the importance of resilience
CO-2	Acquire knowledge to make good decisions
CO-3	Develop problem-solving skills
CO-4	Evaluate the uses of tenses in English
CO-5	Use English effectively at the workplace.

Relationship Matrix

Semester	Course Code			Title of the Course			Hours	Credits			
II	24ULEN21			General English - II			90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	3	1	3	1		1	3	3	3	1
CO-2	3	3	3	3	2		3	3	3	3	2
CO-3	3	3	3	3	1		3	3	3	3	1
CO-4	3	3	3	2	1		3	3	3	1	2
CO-5	1	3	2	3	3		3	3	3	3	3
Average	2.6	3	2.4	2.8	1.6		2.6	3	3	2.6	1.8
	STRONG – 3, MEDIUM – 2 , LOW – 1										

Prepared by : Dr.L.Faustina Leo

Checked by: Dr. S. Mohamed Haneef

Head of the Department

Semester-II	PROGRAMMING IN PYTHON		24UCAS21			
Core-II			L	T	P	C
Hrs./Week:5	Hrs./Semester:75	Marks:100	5	-	-	5

General Objective

To provide a comprehensive understanding of Python programming concepts, enabling students to write clean, efficient, and scalable code. The course aims to develop logical thinking and problem-solving skills by applying Python's constructs to real-world applications, particularly in Artificial Intelligence and Data Science domains.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand Python's core features, syntax, and data types, and perform basic input/output and string operations.
LO-2	Apply flow control mechanisms, looping constructs, and functions — including recursion and lambda expressions — for structured programming.
LO-3	Gain proficiency in Python's built-in data structures such as lists, tuples, dictionaries, and sets for efficient data manipulation.
LO-4	Develop modular and reusable code using modules, packages, and file handling with proper exception management.
LO-5	Apply Object-Oriented Programming (OOP) concepts like classes, inheritance, and polymorphism to design robust Python applications.

UNIT I Fundamentals and data types

Introduction to Python: Features, advantages for AI/DS applications- Python interpreter- IDEs-Python syntax: indentation, comments, variables, identifiers, keywords-Data Types -Type conversion and type checking- Operators -Operator precedence and expressions-Input/Output operations - Basic string operations- string methods.

UNIT II Control Flow and Functions

Flow Control: Decision Making – Loops – Nested Loops – Types of Loops- Functions: Function definition and calling-Parameters and

arguments: positional, keyword, default, variable-length (*args, **kwargs)-
Return values (single and multiple)-Scope: local, global, and nonlocal
variables-Lambda functions -Recursion

UNIT III Data Structures

Lists: List creation, operations -List methods-List comprehension-
Aliasing vs cloning- Tuples: Tuple creation and operations-Tuple packing
and unpacking-Immutability and use cases- Dictionaries: Dictionary
creation and operations-Dictionary methods-Dictionary comprehension-
Nested dictionaries- Sets: Set creation and operations-Set methods and
mathematical operations.

UNIT IV Modules, Packages and File Handling

Modules and Packages: Creating and importing modules-import
statement variants-The name variable-Standard library modules-Packages-
File Handling-File types: text and binary files-Reading and writing files-
Exception handling with files- Exception Handling: Built-in exceptions -
Raising exceptions-User-defined exceptions

UNIT V Object-Oriented Programming Concepts

Classes and objects: definition, instantiation-Attributes and methods
(instance and class)-Constructor and destructor -Encapsulation and data
hiding-Inheritance -Method overriding-Polymorphism

REFERENCE BOOKS:

1. Mark Lutz, *Learning Python*, O'Reilly Media, 2025, ISBN: 9781098171278.
2. Dr. Sitanath Biswas, Dr. Bikramjit Sarkar, Dr. Sayan Chakraborty, Mr. Dipeswar Pal, and Mr. Debarpan Das, *A Handbook to Python*, Chyren Publication, 2024, ISBN: 9789348530530.
3. Allen B. Downey, *Think Python: How to Think Like a Computer Scientist*, O'Reilly Media, Incorporated, 2024, ISBN: 9781098155438.
4. Paul Barry, *Head First Python*, O'Reilly Media, 2023, ISBN: 9781492051268.
5. Brett Slatkin, *Effective Python: 125 Specific Ways to Write Better Python*, Pearson Education, 2024, ISBN: 9780138172275.

Web Link:

1. <https://www.geeksforgeeks.org/python/python-programming-language-tutorial/>
2. <https://docs.python.org/3/tutorial/index.html>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe Python's syntax, data types, and core features for problem-solving.
CO-2	Apply control statements, loops, and functions to implement logical program structures.
CO-3	Analyze and manipulate data using Python's built-in data structures efficiently.
CO-4	Demonstrate modular programming using modules, packages, and file operations with exception handling.
CO-5	Design and develop object-oriented programs applying concepts of encapsulation, inheritance, and polymorphism.

Relationship Matrix

Semester	Course Code		Title of the Course				Hours		Credits		
II	24UCAS21		PROGRAMMING IN PYTHON				75		5		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	2	2	2	3	2	1	2
CO-3	2	3	2	2	2	2	2	3	3	2	3
CO-4	2	3	3	2	3	3	2	3	3	2	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2.2	1.8	2.4	2.2	2.2	2.8	2.4	1.8	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. M.Nagoor Meeral

Checked by: Dr.V.Roseline

Head of the Department

Semester-II	PROGRAMMING IN PYTHON LAB		24UCAS2P			
Core-IIP			L	T	P	C
Hrs./Week:3	Hrs./Semester:45	Marks:100	3	-	3	-

General Objective

1. To provide a comprehensive practical understanding of Python programming through hands-on exercises.
2. This course aims to enable students to write clean, efficient, and scalable programs while developing logical thinking and problem-solving abilities.
3. By implementing real-world applications, students will learn how Python can be applied across domains such as Data Science, Artificial Intelligence, and Software Development.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand and apply Python's syntax, core features, data types, and perform input/output and string operations through interactive coding tasks.
LO-2	Implement control flow statements, looping constructs, recursion, and lambda functions to develop structured and logical programs.
LO-3	Gain proficiency in Python's built-in data structures such as lists, dictionaries, and sets to perform data storage, analysis, and manipulation effectively.
LO-4	Develop modular, reusable, and well-organized code using Python modules, packages, and file handling with exception management.
LO-5	Apply Object-Oriented Programming (OOP) concepts such as classes, constructors, encapsulation, inheritance, and polymorphism to build real-world applications.

1. **Interest Calculator** – Program to compute Simple and Compound Interest based on user input.
2. **Leap Year Identifier** – Program to determine whether a given year is a Leap Year using decision-making statements.
3. **Fibonacci Series Visualizer** – Program to generate the Fibonacci Series up to n terms using loops.
4. **Factor Counter Function** – Program to count and display the number of factors of a number using user-defined functions.
5. **Lambda Power Calculator** – Program to compute the power of a number (x^n) using a lambda function.
6. **Recursive GCD Finder** – Program to find the Greatest Common Divisor (GCD) of two numbers using recursion.
7. **List Statistics Generator** – Program to compute sum, average, minimum, and maximum of list elements.
8. **Duplicate Remover** – Program to remove duplicate elements from a list using sets.
9. **Student Marksheet (Dictionary)** – Program to store and display student marks using a dictionary.
10. **Set Operation Demonstrator** – Program to perform union, intersection, and difference between two sets.
11. **Word Frequency Counter** – Program to count word occurrences in a paragraph using dictionary comprehension.
12. **Custom Math Module** – Program to create a user-defined module containing basic math functions and import it into another file.
13. **Random Password Generator** – Program to generate secure passwords using the random and string modules.
14. **File Copy Program** – Program to copy the contents from one file to another using file handling operations.
15. **Exception Handler Demo** – Program to demonstrate try, except, else, and finally blocks using a division-by-zero example.
16. **User-Defined Exception** – Program to create and raise a custom exception for invalid user input (e.g., age validation).

17. **Bank Account (Encapsulation)** – Program demonstrating encapsulation using a private balance attribute with getter and setter methods.
18. **Student Record Manager (Constructor & Destructor)** – Program to create a class that uses constructor and destructor to show object creation and deletion.
19. **Shape Area Calculator (Inheritance & Polymorphism)** – Program demonstrating inheritance and method overriding for calculating areas of different shapes.
20. **Library Management System (Comprehensive OOP)** – Program combining classes, inheritance, encapsulation, and polymorphism to manage library books and members.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Demonstrate understanding of Python's syntax, data types, operators, and string manipulation through program implementation.
CO-2	Apply decision-making, looping, recursion, and function-based logic to solve computational problems effectively.
CO-3	Use Python's built-in data structures (lists, dictionaries, sets) to analyze, manipulate, and organize data efficiently.
CO-4	Develop modular and robust programs using modules, packages, and file operations, including exception handling techniques.
CO-5	Design and implement Python applications using Object-Oriented Programming principles such as encapsulation, inheritance, and polymorphism.

Relationship Matrix:

Semester	Course Code			Title of the Course				Hours	Credits		
II	24UCAS2P			PROGRAMMING IN PYTHON LAB				3	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	2	2	2	3	2	1	2
CO-3	2	3	2	2	3	2	2	3	3	2	3
CO-4	2	3	3	2	3	3	2	3	3	2	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2.2	1.8	2.6	2.2	2.2	2.8	2.4	1.8	2.6

STRONG(3),MEDIUM(2)andLOW(1)

Prepared by :Dr. M.Nagoor Meeral

Checked by: Dr.V.Roseline

Head of the Department

Semester-II	NUMERICAL METHODS		24UAMA25			
EC-II (Allied)			L	T	P	C
Hrs./Week:6	Hrs./Semester:90	Marks:100	6	-	-	5

General Objective:

- To cultivate analytical thinking and problem solving skills through different methods of solving equations
- To introduce students to the concept of central tendency and its significance in statistical analysis

Learning Objectives (LO)

LO	The learners will be able to :
LO – 1	Obtain numerical solutions of Algebraic and Transcendental Equations
LO – 2	To know about the basic concepts of finite differences
LO – 3	To compute the integration using Trapezoidal and Simpson's rule
LO – 4	Equip students with the skills to calculate and interpret measures of central tendency using appropriate statistical techniques
LO – 5	Understand the meaning of the term correlation and the significance of its study

UNIT IAlgebraic and Transcendental Equations

Bisection Method, Newton Raphson Method, Iteration method.

UNIT IIFinite differences

Forward, Backward differences-Central Difference.

UNIT III Numerical Integration

Numerical Integration using Trapezoidal rule and Simpson's first & second rules (proof not needed).

UNIT IVArithmetic Mean

Arithmetic Mean – Geometric Mean – Harmonic Mean - Median, Mode, Standard Deviation - Quartile Deviation – Percentiles.

UNIT VCorrelation and Regression

Correlation and Regression –Properties of Simple Correlation and regression coefficients – Simple Numerical Problems only.

TEXT BOOKS:

1. S.S. Sastry, Introductory Methods of Numerical Analysis, Fifth Edition, PHI Learning Private Limited, Delhi-2018.
2. Gupta S.C & Kapoor, V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi - 2020.

Unit I : TB 1- Chapter 2 (Section 2.2,2.4,2.5)

Unit II : TB 1- Chapter 3 (Section 3.3 (3.3.1,3.3.2,3.3.3))

Unit III : TB 1- Chapter 6 (Section 6.4 (6.4.1,6.4.2,6.4.3))

Unit IV: TB 2 - Chapter 2 (Section 2.5-2.9, 2.13(2.13.2, 2.13.4))

Unit V : TB 2 - Chapter 10, Chapter 11

REFERENCE BOOKS:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 2014.
2. C.E. Froberg, Introduction to Numerical Analysis, II Edn., Addison Wesley, 1979.
3. Arumugam S, Issac and Somasundaram, Numerical methods, SCITECH Publication, Chennai, 2012.
4. Kandasamy A, Thlagavathy K and Gunavathi K, Numerical Methods, S Chand & Company Pvt Ltd, New Delhi, 2015.
5. Arumugam S and Isaac, Statistics, New Gamma Publishing house, Palayamkottai, Edition July 2015.

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Applying various methods to find the solution of Algebraic and Transcendental Equations
CO-2	Identify the various types of finite differences
CO-3	Discuss the concept of numerical integration using trapezoidal and Simpson's rule
CO-4	Demonstrate proficiency in calculating measures of central tendency for both grouped and ungrouped data sets
CO-5	Interpret the important properties of correlation coefficient and regression

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
II	24UAMA25	Numerical Methods					90	5			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	3	2	3	3	-	3	3	-
CO2	3	3	1	2	3	1	3	-	3	3	-
CO3	3	2	3	3	2	2	3	-	3	3	-
CO4	2	3	3	2	3	3	3	-	3	3	-
CO5	3	2	3	2	3	2	3	-	3	3	-
	3	2.4	2.6	2.4	2.6	2.2	3		3	3	

STRONG – 3, MEDIUM – 2 AND LOW - 1

Semester-II	DATA ANALYTICS USING SPREAD SHEETS		24UNAS21			
SEC-II			L	T	P	C
Hrs./Week:2	Hrs./Semester:30	Marks:50	2	-	-	2

General Objective

To introduce students to the fundamental concepts and practical applications of Microsoft Excel for data analysis, including data entry, cleaning, manipulation, visualization, and statistical interpretation. The course aims to develop analytical thinking and technical skills required to organize, process, and interpret data for decision-making in academic and real-world scenarios.

Learning Objectives

LO No.	The learners will be able to
LO-1	Understand the Excel interface and apply basic worksheet operations including formatting, navigation, and cell referencing techniques.
LO-2	Apply data cleaning and validation techniques such as sorting, filtering, removing duplicates, and structuring data efficiently.
LO-3	Use Excel formulas and built-in functions to perform mathematical, logical, text, and lookup-based computations.
LO-4	Analyze and visualize data using charts, conditional formatting, and what-if analysis tools for decision-making.
LO-5	Apply PivotTables and statistical tools to summarize, interpret, and analyze large datasets effectively.

UNIT I Introduction to Excel for Data Analysis

Excel Interface - Ribbon, Tabs, Groups, Workbook, Worksheet - Customization and Navigation - Cell referencing (relative, absolute, mixed) - Creating and formatting worksheets - Using basic shortcuts- Print area, print preview, page layout options.

UNIT II Data Cleaning and Validation

Data Entry and Formatting - Data Validation Techniques - Input restrictions, drop-down lists - Sorting and Filtering - Grouping and Ungrouping - Removing duplicates - Text-to-columns - Flash Fill.

UNIT III Formulas and Functions

Basic formulas and operators - Numeric Functions (SUM, AVERAGE, MIN, MAX) -Text Functions (LEFT, RIGHT, MID, CONCATENATE, LEN) - Date and Time Functions (TODAY, NOW, DATEDIF) - Logical Functions (IF, AND, OR, NOT, Nested IF) - Lookup Functions (VLOOKUP, HLOOKUP, INDEX, MATCH) - Formula auditing and error checking

UNIT IV Visualizing and Analyzing Data

Creating and customizing charts - Column, Line, Pie, Bar, Combo - Conditional Formatting for highlighting trends - What-If Analysis: Scenario Manager - Goal Seek - Data Tables (1-variable and 2-variable)

UNIT V PivotTables and Basic Statistical Analysis

Importing Data (CSV, XML) - Creating PivotTables and PivotCharts - Using Slicers - Applying Filters and Field Settings -Descriptive Statistics (using Data Analysis Toolpak): - Mean, Median, Mode, Std. Dev - Correlation and Regression Analysis (via Toolpak)

REFERENCE BOOKS:

1. Steven M. Freund, Joy Starks, Eric J. Schmieder, *Microsoft Office 365 Excel 2016: Comprehensive*, Cengage Learning, 2017.
2. Manisha Nigam, *Data Analysis with Excel*, BPB Publications, 2019, ISBN: 9789389328035.
3. Data Analysis using Excel Tutorial by edureka.
4. George Mount, *Modern Data Analytics in Excel*, O'Reilly Media, 2024, ISBN: 9781098148799.
5. Joseph Schmuller, *Statistical Analysis with Excel For Dummies*, Wiley, 2013, ISBN: 9781118464311.

Web Link:

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==>
2. https://onlinecourses.swayam2.ac.in/imb24_mg56/preview

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Demonstrate understanding of Excel interface, worksheet operations, and basic formatting techniques.
CO-2	Apply data cleaning, validation, sorting, and filtering techniques for structured data preparation.
CO-3	Use Excel formulas and functions to perform mathematical, logical, and lookup-based computations.
CO-4	Analyze and visualize data using charts, conditional formatting, and what-if analysis tools.
CO-5	Apply PivotTables and statistical tools for data summarization and interpretation.

Relationship Matrix

Semester	Course Code		Title of the Course				Hours	Credits			
II	24UNAS21		DATA ANALYTICS USING SPREAD SHEETS				30	2			
Course Outcome s (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	2	1	1	2
CO-2	2	3	2	1	2	2	2	3	2	1	2
CO-3	2	3	2	2	3	2	2	3	3	2	3
CO-4	2	3	3	2	3	3	2	3	3	3	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2.2	1.8	2.6	2.2	2.2	2.8	2.4	2	2.6

STRONG(3),MEDIUM(2) and LOW(1)

Prepared by :Dr. K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester – II	VALUE EDUCATION-I		24USVE2A			
SEC-III			L	T	P	C
Hrs./Week: 2	Hrs./Semester : 30	Marks :50	2	-	-	2

General Objective: To make students inculcate moral values, leading to faith and righteous action in their life.

Unit IIslam – Meaning – Importance – A complete Religion – The religion accepted by God – Five Pillars of Islam – Kalima – Prayers – Fasting – Zakat – Haj.

Iman – Monotheism – Angels – Books – Prophets – Dooms Day – Life after death – Heaven and Hell.

Unit IIQuran – The Book of Allah – Wahi – Revelation to Prophet Muhammad(sal) – Compilation – Preservance – Structure – Content – Purpose – Source of Islamic Law– SuraFathiha, Kafirun, Iqlas, Falakh and Nas.

Unit IIIHadith – Siha Sitha – Buhari – Muslim – Tirmithi – Abu Dawood – Nasai – Ibn Maja – Collection of Hadith – Meaning of 40 Hadith.

Unit IVLife History of Prophet Muhammad (sal) – AiamulJahiliya – Prophet’s Childhood and Marriage – Prophethood – Life at Mecca – Life at Medinah – Farewell Address – Seal of Prophethood.

Unit VGood character – Etiquettes – Halal and Haram – Duties towards Allah – Duties towards fellow beings – MasnoonDuas.

Textbooks:

Publication of SadakathullahAppa College

Reference Books:

1. V.A. Moahmed Ashrof – Islamic Dimensions – Reflection and Review on Quranic Themes.
2. The Presidency of Islamic Researchers – Revised & Edited – The Holy Quran.
3. M. Manzoor Nomani – Islamic Faith & Practice.
4. Ali Nadawi, Abul Hasan– Muhammad Rasulullah., Muassasathus Sahafawa Nashr Publication Lucknow, India,1999.
5. K. Ali – A Study of Islamic History.
6. Abdul Rahuman Abdulla
h – Islamic Dress code for Women.
7. Dr. Munir Ahamed Mughal – Code For Believers.
8. Abdul Malik Mujahid – Gems and Jewels.

Semester – II	VALUE EDUCATION-II		24USVE2B			
SEC-III			L	T	P	C
Hrs./Week: 2	Hrs./Semester : 30	Marks :50	2	-	-	2

UNIT I

Individual Morality – Objective of Moral life – Living in accordance with the code of Morality – the goodness of Morality – Morality and *Thirukural*- The need for faith.

UNIT II

Adherence to higher code of Morality – Fear of God – Good Moral Values – Duty to Parents – Teacher, respecting elders – Moral Etiquettes – Right-minded Principle – High Principles for Proper conduct.

UNIT III

Inculcating good attitudes – Open mindedness – Morale – analysing the pros and cons of good and bad – Service to others – Mind Power, tolerance, respecting others, showing love to others, patience – tranquility – Modesty, kindness and forgiveness.

UNIT IV

Quotations and moral Stories expressing Good characters of Great personalities – Life History of Great people: Mahatma Gandhi, Abraham Lincoln, Dr. A.P.J. Abdul Kalam.

UNIT V

Truth, the importance of uprightness, integrity, friendship – Health awareness on Alcohol and drug abuse – inculcating reading habit – reading good books – Hygiene – Dowry – Corruption.

Textbooks:

Publication of Sadakathullah Appa College.

Semester - III	COMMUNICATION SKILL IN ARABIC		24ULAR31			
LANG – I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective: To make the students to develop the skill of basic Arabic Grammar and Translation skills from Arabic to English vice-versa.

Learning Objectives

LO	The learners will be able to:
LO 1	To perfect the mastery of Arabic with efficient communicative skills and expressive capabilities. Saying Salam and greetings, Saying Good bye, At the Airport.
LO 2	Information seeking At the restaurant and the hotel, Enquiry for an accommodation .
LO 3	Information seeking at the bank.
LO 4	Information seeking at the office, post office,
LO 5	Information seeking at the mall.

UNIT I - التعرف في المطار -

UNIT II - في الفندق - في المطعم -

UNIT I - في البنك - عند الطبيب -

UNIT II - في الطريق - في مكتب البريد -

UNIT I - في السوق - في السوق -

Textbooks:

الكتاب الأساسي في تعليم اللغة العربية لغير الناطقين بها (الجزء الأول) - السعيد محمد بدوي و فتحي علي يونس

Al Kitaab Al Asaasi Fi Taleem Al Lugha Al Arabiyya Li Ghair An Naatiqeena Biha - Part I,
By Sayeed Muhaamad Badawi and Fathi Ali Yunus

Reference Books:

A Practice Book on Gulf Arabic, By Dr. Abdul Jaleel.T Arabic Conversation Book, By Mohd.Harun Rashid and Khalid PerwezA Hand book of Commercial Arabic by Dr. Aboobacker K.P

www.talkinarabic.com

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Equip students with the necessary skills to effectively communicate in Arabic
CO-2	Correlate between the Spoken Arabic and Written Arabic
CO-3	Describe about the feelings in Arabic
CO-4	Able to communicate in Arabic
CO-5	Compare between the dialects of Arab people

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
III	24ULAR31	COMMUNICATION SKILL IN ARABIC					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	3	3	2	2	3	2	3	2	1	2
CO-2	3	3	3	2	3	2	3	3	2	2	1
CO-3	3	3	3	2	2	1	3	3	2	3	3
CO-4	3	3	3	2	1	3	2	3	2	1	1
CO-5	3	3	3	2	2	2	3	3	2	2	2
Average	3	3	3	2	2	2.2	2.6	3	2	1.8	1.8

STRONG – 3, MEDIUM – 2 , LOW – 1

Prepared by: Dr. S.A.MohamedRafeek

Checked by: Dr. J. Ubaiyathulla

Head of the Department

Semester - III	பொதுத்தமிழ் -3 தமிழகவரலாறும்பண்பாடும்		24ULTA31			
LANG – I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	--	--	3

General Objective:

- தமிழக வரலாற்றை அறிந்து கொள்ளுதல்.
- தமிழரின் வாழ்வியல் தொன்மையை அறிதல்.
- தமிழரின் பண்பாட்டினை அறிந்து கொள்ளுதல்.
- தமிழர்மேல் நிகழ்ந்த பிற பண்பாட்டுத் தாக்கங்களை அறிதல்.
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்பக்கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.

Learning Objectives:

LO	The Learners will be able to:
LO - 1	தொல் பழங்காலத்தைப் பற்றியும் திணை வாழ்வியல் மற்றும் தமிழ் வளர்த்த சிறப்பினையும் அறிந்து கொள்வர்.
LO - 2	தமிழகத்தை ஆண்ட மன்னர்களைப் பற்றி அறிந்து கொள்வர்.
LO - 3	ஐரோப்பியர் காலத்தில் ஆட்சிபுரிந்தவர்களைப் பற்றியும் விடுதலைப் போராட்டத்தில் தமிழ்நாட்டை ஆண்டவர்களைப் பற்றியும் அறிந்துகொள்வர்.
LO - 4	விடுதலைக்குப்பின் தமிழ்நாட்டில் மொழி, சமூகம், தொழில் வளர்ச்சி நிலைகள் பற்றியும் தெரிந்து கொள்ளுதல்.
LO - 5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்க அறிந்து கொள்வதற்கும் மொழிப்பெயர்ப்புப் பயிற்சி பெறுவர்.

அலகு- 1தொல் பழங்கால வரலாறும் சங்ககால வரலாறும்

1. தொல் தமிழர்
2. பழைய கற்காலம்
3. புதியகற்காலம்
4. உலோகக் காலம்
5. அகழ்வாராய்ச்சியில் தமிழும் தமிழரும் (கீழடி வரை)
6. திணை வாழ்வியல் (களவு வாழ்க்கை, கற்பு வாழ்க்கை, உணவு, அணிகலன்கள், வாணிகம், விளையாட்டுகள்)
7. கல்வியும், கலைகளும்
8. தமிழ் வளர்த்தசங்கம்
9. சங்ககால ஆட்சிமுறை
10. அயல்நாட்டுத் தொடர்புகள்

அலகு - 2 ஆட்சியர் வரலாறு

- 1.முவேந்தர் வரலாறு
- 2.பல்லவர் வரலாறு
- 3.நாயக்கர் ஆட்சி
- 4.இஸ்லாமியர் ஆட்சி
- 5.மராட்டியர் ஆட்சி

அலகு - 3 ஐரோப்பியர் கால வரலாறு

1. போர்த்துக்கீசியர்
2. டச்சுக்காரர்கள்
3. டேனிஸ்காரர்கள்
4. பிரெஞ்சுக்காரர்கள்
5. ஆங்கிலேயர்கள்
6. பாளையக்காரர்கள்
7. இந்திய விடுதலைப் போராட்டத்தில் தமிழ்நாடு

அலகு-4 விடுதலைக்குப்பின் தமிழ்நாட்டு வரலாறு

8. மொழிப்போராட்டம்
9. சமூக மறுமலர்ச்சி
10. தொழில்நுட்ப வளர்ச்சி

அலகு-5 மொழிப்பயிற்சி

• நிறுத்தர்குறிகள்

• கலைச்சொற்கள்

• மொழிபெயர்ப்பு

பயிற்சி : ஆங்கிலக் கலைச் சொற்களைக் கொடுத்து அவற்றைத் தமிழில் மொழிபெயர்க்கச் செய்தல்.

பாட நூல்:

பதிப்பாசிரியர் முனைவர் ச.மகாதேவன், தமிழ்த்துறைத் தலைவர் மற்றும் தமிழ்ப்பாடத்திட்டக் குழுத் தலைவர் பொதுத்தமிழ் - 3, தமிழக வரலாறும் பண்பாடும், சதக்கத்துல்லாஹ் அப்பா கல்லூரி வெளியீடு 2025— 2026 (முதற் பதிப்பு).

பார்வை நூல்கள்

1. தமிழக சமுதாயப் பண்பாட்டுக் கலைவரலாறு - கு. சேதுராமன், என்.சி.பி.எச், சென்னை,
2. தமிழர் கலையும் பண்பாடும் - அ.கா. பெருமாள், என்.சி.பி.எச், சென்னை.
3. ஒரு பண்பாட்டின் பயணம்: சிந்து முதல் வைகைவரை - ஆர். பாலகிருஷ்ணன், ரோஜா முத்தையா ஆராய்ச்சி நூலகம், சென்னை.
4. தமிழும் பிறப்பண்பாடும் - தெ.பொ. மீனாட்சி சுந்தரனார், நியூ செஞ்சுரிபுக் ஹவுஸ், சென்னை
5. தமிழர் வரலாறும் பண்பாடும் - நீலகண்டசாஸ்திரி, ஸ்ரீ செண்பகா பதிப்பகம், சென்னை
6. தமிழர் வரலாறும் தமிழர் பண்பாடும் - மா.இராசமாணிக்கனார்
7. தமிழர் நாகரிகவரலாறு - க.த.திருநாவுக்கரசு, தொல்காப்பியர் நூலகம், சென்னை.

- <https://www.chennailibrary.com/>
- <https://www.sirukathaigal.com>
- <https://www.tamilvirtualuniversity.org>
- <https://www.noolulagam.com>

- <https://www.katuraitamilblogspot.com>

Course Outcomes

CO	Upon completion of this course, students will be able to
CO-1	தொல் பழங்காலத்தைப் பற்றியும் திணைவாழ்வியல் மற்றும் தமிழ்வளர்த்த சிறப்பினையும் அறிந்து கொள்வர்.
CO-2	தமிழகத்தை ஆண்ட மன்னர்களைப் பற்றி அறிந்து கொள்வர்.
CO-3	ஐரோப்பியர் காலத்தில் ஆட்சி புரிந்தவர்களைப் பற்றியும் விடுதலைப் போராட்டத்தில் தமிழ்நாட்டை ஆண்டவர்களைப் பற்றியும் அறிந்து கொள்வர்.
CO-4	விடுதலைக்குப்பின் தமிழ்நாட்டில் மொழி, சமூகம், தொழில்வளர்ச்சி நிலைகள் பற்றியும் தெரிந்து கொள்ளுதல்.
CO-5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதியகலைச் சொற்களை உருவாக்கவும் அறிந்து கொள்வதற்கும் மொழிப்பெயர்ப்புப் பயிற்சி பெறுவர்.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
III	24ULTA31	தமிழகவரலாறும் பண்பாடும்						90	3		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	2	3	2	2	3	3	3	3	2	3
CO-2	2	2	2	3	3	2	2	2	3	2	2
CO-3	3	3	3	2	2	3	3	3	2	3	3
CO-4	3	2	3	3	3	3	3	2	3	2	2
CO-5	2	2	3	3	2	2	3	2	2	2	2
Average	2.6	2.2	2.8	2.6	2.4	2.6	2.8	2.4	2.6	2.2	2.4

3 – STRONG, 2 – MEDIUM, 1- LOW

Prepared by :Dr. A.S. Shaik Sindha

Checked by:
Dr.S.Mahadevan
Head of the Department of Tamil

Semester - III	General English III		24ULEN31			
LANG-II			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

To facilitate communication skills in English, enhance effective listening, speaking and interpersonal relationships, manage stress and achieve better business communication.

Learning Objectives (LO)

LO	The learners will be able to:
LO – 1	Improve their listening and speaking skills.
LO – 2	Enhance the interpersonal relationship skills.
LO – 3	Embolden them to cope with stress.
LO – 4	Develop effective communication skills.
LO – 5	Help them use English effectively in a business environment.

Unit - I

Skills and Virtues focussed: Active Listening

Short Story

“In a Grove”– Akutagawa Ryunosuke
(Translated from Japanese by Takashi Kojima)
“The Gift of the Magi”– O’ Henry

Prose

“Listening”– Robin Sharma
“Nobel Prize Acceptance Speech”– Wangari Maathai
“Of Friendship”– Francis Bacon

Unit – II

Skills and Virtues focussed: Interpersonal Relationships

Poetry

“Telephone Conversation”– Wole Soyinka
“Ulysses”– Alfred Lord Tennyson
“And Still I Rise” – Maya Angelou

Unit – III

Skills and Virtues focussed: Coping with Stress

Poetry

“Leisure”– W.H. Davies
“Anxiety Monster” – Rhona McFerran

Readers’ Theatre

The Forty Fortunes: A Tale of Iran – Aaron Shepherd
Where there is a Will– Mahesh Dattani

Unit – IV

Skills focussed: Language Competency

Grammar

Modals and Auxiliaries

Verb Phrases – Gerund, Participle, Infinitive

Phrasal Verbs and Idioms

Unit – V

Skill focussed: Writing Skill

Official Correspondence – Leave Letter, Letter of Application, Permission Letter

Drafting Invitations

Brochures for Programmes and Events

Textbooks:

1. Wangari Maathai – Nobel Lecture. Nobel Prize Outreach AB 2023. July, 2023.
2. Mahesh Dattani, *Where there is a Will*. Penguin, 2013.
3. Martin Hewings, *Advanced English Grammar*, Cambridge University Press, 2000.
4. Raymond Murphy, *Essential English Grammar*, Cambridge University Press, 2024.

Reference Books:

1. Pillai, G. Radhakrishna, et al. *Written English For You*.
2. Communicative English – II – (Semester II) - TANSCH

Web Sources:

1. Wangari Maathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Mon. 17 Jul 2023.
<https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/>
2. Telephone Conversation - Wole Soyinka
https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
3. Anxiety Monster- Rhona McFerran- www.poetrysoup.com
4. The Gift of the Magi – O’ Henry
<https://www.lakes.k12.in.us/cms/lib/IN01001338/Centricity/Domain/325/Gift%20of%20the%20Magi.pdf>
5. Of Friendship – Francis Bacon
<https://www.faena.com/aleph/francis-bacon-on-friendship>
7. Ulysses – Alfred Lord Tennyson
<https://www.poetryfoundation.org/poems/45392/ulysses>
8. And Still I Rise – Maya Angelou
<https://www.poetryfoundation.org/poems/46446/still-i-rise>
9. <https://englishverse.com/poems/leisure>
10. Drafting Invitation -
<https://teachmint.storage.googleapis.com/public/93213425-8916-43b7-8279-f236d102ba07.pdf>
11. Brochures for programmes and Events –
<https://extensionpubs.unl.edu/publication/g2028/2011/pdf/view/g2028-2011.pdf>

Course Outcomes

CO	Upon completion of this course, students would have learnt to:
CO-1	Improve their listening and speaking skills.
CO-2	Develop interpersonal relationship skills.
CO-3	Acquire self-confidence to cope with stress.
CO-4	Apply English language skills to access academic, professional and social opportunities.
CO-5	Accomplish business communication effectively.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
III	24ULEN31	GENERAL ENGLISH - III					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	2	3	3	3	2	1	2	3	3	3	2
CO-2	2	3	3	3	3	1	2	3	3	3	2
CO-3	2	3	3	3	2	1	2	3	3	3	2
CO-4	2	3	3	3	2	1	2	3	3	3	1
CO-5	2	3	3	3	2	1	2	3	3	3	2
Average	2	3	3	3	2.2	1	2	3	3	3	1.8
	STRONG – 3, MEDIUM – 2 , LOW – 1										

Prepared by,
Dr.L.Faustina Leo

Dr. S. Mohamed Haneef
Head of the Department

Semester-III	DATABASE MANAGEMENT SYSTEMS		24UCAS31			
Core-III			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks:100	5	-	-	5

General Objective

To provide a strong foundation in database management systems by introducing data modeling, relational database concepts, SQL programming, normalization, transaction management, and database security. The course aims to develop the ability to design, implement, and manage efficient database systems and to apply database concepts in Artificial Intelligence and Data Science applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand fundamental concepts of databases, DBMS architecture, data abstraction, and different types of databases including NoSQL systems.
LO-2	Apply data modeling techniques using ER diagrams and convert them into relational schemas with appropriate constraints.
LO-3	Use SQL to create, manipulate, and query relational databases, including joins, nested queries, and indexing.
LO-4	Analyze database normalization techniques and transaction management concepts to ensure data consistency and integrity.
LO-5	Understand database security, recovery mechanisms, and explore the role of DBMS in Artificial Intelligence and Data Science applications.

UNIT I Introduction to Database Systems

Overview of Data and Databases: Data vs Information-Database and Database System-Characteristics -Advantages -DBMS Architecture: Three-Level Architecture -Database Schemas and Instances-Database Users and Administrators - Data Abstraction and Data Independence-Types of Databases:Centralized and Distributed Databases-Operational vs Analytical Databases-Introduction to NoSQL Databases

UNIT II Data Models and Database Design

Data Models: Hierarchical Model, Network Model, Relational Model, Object-Oriented Data Model-Entity-Relationship (ER) Model: Entities, Attributes, and Entity Sets-Types of Attributes (Simple, Composite, Derived, Multivalued)-Relationships and Relationship Sets-Cardinality and Participation Constraints-Weak Entities-Generalization and Specialization-

ER Diagram to Relational Model Mapping: Conversion of ER Diagrams into Tables-Keys and Constraints

UNIT III Relational Model and SQL

Relational Database Concepts: Relations, Tuples, Attributes, Domains-Keys: Super Key, Candidate Key, Primary Key, Foreign Key-Integrity Constraints-Structured Query Language (SQL):Data Definition Language (DDL)- Data Manipulation Language (DML) -Data Query Language (DQL) -Aggregate Functions and Nested Queries -Joins (Inner, Outer, Natural)-Views and Indexes

UNIT IV Normalization and Transaction Management

Normalization: Functional Dependencies - Normal Forms -Boyce-Codd Normal Form (BCNF)- Advantages and Limitations of Normalization - Introduction to Lock-Based Protocols-PL-SQL basics

UNIT V Database Security, Recovery, and Applications in AI & DS

Database Security :Database Security Concepts -User Authentication and Authorization -Roles and Privileges -SQL Injection (Conceptual overview) -Recovery Management:Types of Failures -Log-Based Recovery -Checkpointing -Backup and Restore- DBMS in AI and Data Science: Role of Databases in Data Collection and Storage -OLTP vs OLAP -Data Warehousing Concepts

Text Books

1. Database System Concepts (7th Edition, 2019) - Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. Fundamentals of Database Systems (7th Edition, 2017) – Ramez Elmasri & Shamkant B. Navathe, Pearson Education

Reference Books

1. An Introduction to Database Systems (8th Edition) - C.J. Date, Pearson
2. SQL for Data Scientists - Renée M. P. Teate, O'Reilly
3. MongoDB: The Definitive Guide (3rd Edition, 2019) - Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, O'Reilly
4. Learning SQL (3rd Edition) - Alan Beaulieu, O'Reilly
5. NoSQL Distilled - Pramod J. Sadalage, Martin Fowler, Addison-Wesley

Online Resources

- MySQL Documentation and Tutorial
- PostgreSQL Official Documentation
- MongoDB University (Free courses)
- SQLZoo and LeetCode for SQL practice

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamental concepts, architecture, and types of database systems.
CO-2	Design ER diagrams and convert them into relational database schemas with appropriate constraints.
CO-3	Apply SQL queries to create, retrieve, update, and manage relational data effectively.
CO-4	Analyze normalization techniques and transaction management for maintaining database integrity.
CO-5	Evaluate database security, recovery methods, and the application of DBMS in AI and Data Science.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours		Credits	
III	24UCAS31		Database Management Systems					75		5	
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	3	3	2	1	2	2	3	2	3	1	2
CO-3	2	3	2	1	3	3	3	3	3	1	2
CO-4	2	3	2	2	2	3	3	2	2	2	2
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.4	2.8	2	1.6	2.4	2.6	2.8	2.2	2.6	1.6	2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. V.Roseline

Checked by: Dr.V.Roseline

Head of the Department

Semester-III	DATABASE MANAGEMENT SYSTEMS LAB		24UCAS3P			
Core- P-III			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks: 100	3	-	3	-

General Objective

To provide hands-on experience in database creation, manipulation, and management using SQL. The course aims to develop practical skills in designing relational databases, performing queries, implementing constraints, and managing transactions, enabling students to apply database concepts effectively in real-world and data-driven applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the basic operations of database systems including creation of databases and tables.
LO-2	Apply SQL commands to define, manipulate, and retrieve data using conditions and constraints.
LO-3	Perform data analysis using aggregation functions, grouping, and filtering techniques.
LO-4	Implement advanced SQL concepts such as joins, subqueries, and views for efficient data retrieval.
LO-5	Demonstrate transaction control and data integrity mechanisms in database systems.

1. Create a database and view existing database and tables
2. Create tables and apply constraints like primary key, Foreignkey, NOT NULL, UNIQUE
3. Create table and insert, update and delete records. Use WHERE clause for conditional operations
4. Create Table and Retrieve data using WHERE, ORDER BY, DISTINCT and LIMIT
5. Create table and implement SQL Aggregation functions ,group the data and filter the data
6. Create table and implement SQL Joins
7. Create table and implement Subqueries
8. Create table and Implement Views
9. Create tables and demonstrate transaction Controls

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Create and manage databases and tables with appropriate constraints.
CO-2	Perform data manipulation operations such as insert, update, delete, and conditional retrieval.
CO-3	Apply SQL queries including aggregation, grouping, and filtering for data analysis.
CO-4	Implement joins, subqueries, and views for complex data retrieval.
CO-5	Demonstrate transaction control mechanisms to ensure data consistency and integrity.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
III	24UCAS3P	DATABASE MANAGEMENT SYSTEMS LAB					45	3			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	2
CO-2	2	3	2	1	2	2	3	2	2	1	2
CO-3	2	3	2	1	2	3	2	3	3	1	2
CO-4	2	3	3	1	2	3	2	3	3	1	2
CO-5	2	3	2	2	2	3	2	2	2	2	2
Average	2.2	2.8	2	1.2	2	2.6	2.4	2.2	2.4	1.2	2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr. V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-III	MACHINE LEARNING		24UAAS31			
EC-T-III (Allied)			L	T	P	C
Hrs./Week:4	Hrs./Semester:60	Marks:100	4	-	-	4

General Objective

To provide a comprehensive understanding of machine learning concepts, algorithms, and techniques for building intelligent systems. The course aims to equip students with the ability to analyze data, develop predictive models, evaluate their performance, and apply machine learning techniques to solve real-world problems in Artificial Intelligence and Data Science domains.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of machine learning, its types, applications, and challenges, along with data preprocessing and feature engineering techniques.
LO-2	Apply supervised learning algorithms such as regression and classification techniques and evaluate model performance using appropriate metrics.
LO-3	Analyze unsupervised learning methods including clustering, dimensionality reduction, and association rule mining.
LO-4	Explore advanced machine learning techniques such as support vector machines, ensemble methods, and neural networks.
LO-5	Evaluate model performance, apply optimization techniques, and understand ethical issues and real-world applications of machine learning.

UNIT I INTRODUCTION TO MACHINE LEARNING

Introduction to Artificial Intelligence and Machine Learning Definition and Scope of Machine Learning - Types of Machine Learning: Supervised Learning, Unsupervised Learning, Semi-Supervised Learning, Reinforcement Learning. Applications of Machine Learning - Challenges in Machine Learning - Data Representation and Feature Engineering - Train, Validation and Test Sets.

UNIT II SUPERVISED LEARNING

Regression Techniques: Simple Linear Regression, Multiple Linear Regression, Polynomial Regression - Cost Function and Gradient Descent, - Model Evaluation Metrics (MSE, RMSE, R^2)

Classification Techniques: k-Nearest Neighbour (k-NN), Naïve Bayes Classifier, Logistic Regression, Decision Tree Classifier -Evaluation Metrics: Accuracy, Precision, Recall, F1-Score, Confusion Matrix.

UNIT III UNSUPERVISED LEARNING

Introduction to Unsupervised Learning- Clustering Techniques:K-Means Clustering, Hierarchical Clustering, DBSCAN- Dimensionality Reduction: Principal Component Analysis (PCA)-Association Rule Mining: Apriori Algorithm, Support, Confidence, and Lift-Cluster and Model Evaluation

UNIT IV ADVANCED MACHINE LEARNING TECHNIQUES

Support Vector Machines (SVM) :Linear and Non-Linear SVM, Kernel Functions:Ensemble Learning: Bagging, Boosting (AdaBoost, Gradient Boosting), Random Forest-Introduction to Neural Networks: Perceptron Model-Multi-Layer Perceptron (MLP)-Back propagation Algorithm

UNIT V MODEL OPTIMIZATION & APPLICATIONS

Overfitting and Under fitting-Bias-Variance Trade-off- Regularization Techniques (L1, L2) -Cross-Validation -Hyperparameter Tuning -Model Deployment Basics -Ethical Issues in Machine Learning -Applications of Machine Learning in Healthcare, Finance, Education, Smart Systems -Case Studies

TEXT BOOKS

1. E. Alpaydin, *Introduction to Machine Learning*, 3rd ed., MIT Press, 2014.
2. T. M. Mitchell, *Machine Learning*, McGraw-Hill, 1997.

REFERENCE BOOKS

1. A. Géron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, 2nd ed., O'Reilly Media, 2019.
2. K. P. Murphy, *Machine Learning: A Probabilistic Perspective*, MIT Press, 2012.
3. C. M. Bishop, *Pattern Recognition and Machine Learning*, Springer, 2006.
4. J. Han, M. Kamber, and J. Pei, *Data Mining: Concepts and Techniques*, 3rd ed., Morgan Kaufmann, 2011.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamental concepts, types, and applications of machine learning.
CO-2	Apply supervised learning algorithms for regression and classification tasks.
CO-3	Analyze data using unsupervised learning techniques such as clustering and dimensionality reduction.
CO-4	Implement advanced machine learning models including SVM, ensemble methods, and neural networks.
CO-5	Evaluate and optimize machine learning models while addressing ethical issues and real-world applications.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
III	24UAAS31	MACHINE LEARNING					60	4			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	2	3	2	1	2	3	3	3	3	1	2
CO-3	2	3	2	1	2	3	3	2	3	1	2
CO-4	2	3	2	2	3	3	2	3	3	2	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2	1.6	2.4	2.8	2.6	2.4	2.8	1.6	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-III	MACHINE LEARNING LAB		24UAAS3P			
EC-P-III(Allied Practical)			L	T	P	C
Hrs./Week: 2	Hrs./Semester: 30	Marks: 50	2	-	1	-

General Objective

To provide practical exposure to machine learning techniques by implementing algorithms for data preprocessing, exploratory data analysis, supervised and unsupervised learning. The course aims to develop hands-on skills in building, evaluating, and interpreting machine learning models for real-world data science applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand and perform data preprocessing techniques such as handling missing values, normalization, and scaling.
LO-2	Conduct exploratory data analysis (EDA) using statistical summaries and visualization tools.
LO-3	Apply supervised learning algorithms such as regression and classification techniques.
LO-4	Implement unsupervised learning methods including clustering and dimensionality reduction.
LO-5	Evaluate machine learning models and interpret results for real-world applications.

1. Program to perform data preprocessing (Handling missing values, normalization, and scaling)
2. Program to perform exploratory data analysis (EDA) using summary statistics and visualize data patterns.
3. Program to implement Support Vector Machine (SVM) for classification
4. Program to implement simple linear regression
5. Program to implement multiple linear regression and evaluate the model
6. Program to implement logistic regression for classification problems
7. Program to implement k-Nearest Neighbors (k-NN) classification
8. Program to implement decision tree classification
9. Program to perform k-Means clustering on a given dataset.
10. Program to perform hierarchical clustering
11. Program to apply Principal Component Analysis (PCA) for dimensionality reduction

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Perform data preprocessing and exploratory data analysis on datasets.
CO-2	Implement regression models for prediction tasks.
CO-3	Apply classification algorithms such as SVM, k-NN, logistic regression, and decision trees.
CO-4	Implement clustering and dimensionality reduction techniques like k-Means, hierarchical clustering, and PCA.
CO-5	Evaluate machine learning models and interpret results effectively.

Relationship Matrix:

Semester	Course Code	Title of the Course					Hours	Credits			
III	24UAAS3P	MACHINE LEARNING LAB					30	1			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	2	2	2	2	3	1	2
CO-2	2	3	2	1	2	2	2	3	3	1	2
CO-3	2	3	2	1	2	3	2	3	3	1	2
CO-4	2	3	2	1	2	3	2	2	3	1	2
CO-5	2	3	3	2	2	3	2	3	3	2	3
Average	2	3	2.2	1.2	2	2.6	2	2.6	3	1.2	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-III	SOFT SKILLS		24USSH31A			
SEC-IV-A			L	T	P	C
Hrs./Week:2	Hrs./Semester:30	Marks:50	2	-	-	2

General Objective:

To equip learners with essential soft skills that enhance personal growth, interpersonal relationships, and professional effectiveness. This course aims to develop competencies such as self-awareness, communication, time management, leadership, and teamwork, which are crucial for navigating challenges in both personal and professional environments. By mastering these skills, learners will be better prepared to contribute meaningfully to their organizations and society.

Learning Objectives

LO	The learner will be able to:
LO1	To understand the significance of soft skills and their application in personal and professional contexts.
LO2	To develop essential life skills such as self-awareness, motivation, and stress management for personal growth.
LO3	To acquire employability skills that enhance job market readiness, including resume writing and interview preparation.
LO4	To apply effective time management techniques to improve productivity and overcome challenges.
LO5	To build leadership and teamwork capabilities through conflict resolution and collaborative decision-making.

Unit I Introduction to Soft Skills

Overview of Soft Skills: Definition, Importance, and Applications - Soft Skills vs. Hard Skills - Key Components of Soft Skills: Life Skills, Employability Skills, and Corporate Skills- Strategies for Developing Soft Skills.

Unit II Life Skills

Understanding Life Skills: Meaning and Significance - Self-Development: Attitude, Motivation, and Self-Awareness - Self-Assessment Tools: SWOT Analysis - Stress Management: Techniques and Strategies -

Practical activity: Role Plays.

Unit III Employability Skills

Job Market Navigation: Internet Skills and Job Portals- Resume Building: Content, Design, and Layout - Job Application Letters: Writing Tips and Formats - Interview Preparation: Techniques and Best Practices- Group Discussions: Roles, Strategies, and Participation- **Practical activity: Mock Interviews.**

Unit IV Time Management and Productivity

Fundamentals of Time Management: Importance and Benefits- Major Obstacles to Effective Time Management- Covey's Time Management Matrix - Techniques for Enhancing Productivity and Efficiency - **Hands on training and exercises.**

Unit V Leadership and Teamwork

Leadership vs. Management: Roles and Responsibilities - Key Traits of Effective Leaders - Team Dynamics: Building and Leading Effective Teams - Conflict Resolution and Decision-Making in Teams - **Practical activity: Management Games.**

Reading list

1. Rao, M. S. (2010). *Soft skills-enhancing employability: connecting campus with corporate*. IK International Pvt Ltd.
2. Sharma, P. (2021). *Soft Skills 3rd Edition: Personality Development for Life Success (English Edition)*. BPB publications.
3. Konar, N. (2021). *Communication skills for professionals*. PHI Learning Pvt. Ltd..
4. Saravanakumar, A. R. (2020). *Life skill education through lifelong learning*. Lulu. com.
5. MITRA, B. K., & MITR, B. K. (2011). *Personality Development*.

Reference Books

1. Sonmez, J. Z. (2015). *Soft Skills*. Manning Publications.
2. Bhatnagar, N. (Ed.). (2011). *Effective communication and soft skills*. Pearson Education India.
3. Jerome, V. B., & Antony, A. (2018). *Soft Skills for Career Success: Soft Skills*. Educreation Publishing.
4. Kechagias, K. (2011). *Teaching and assessing soft skills*.
5. Klaus, P., Rohman, J., & Hamaker, M. (2007). *The hard truth about soft skills*. Harper Collins Publishers.

Web Resources

1. <https://www.geeksforgeeks.org/introduction-to-soft-skills/>
2. <https://www.osou.ac.in/eresources/Soft-Skills-ccs04.pdf>
3. <https://www.ktunotes.in/ktu-syllabus-life-skills/>
4. https://nios.ac.in/media/documents/350_employability_skills/350_Book_01.pdf
5. <https://in.indeed.com/career-advice/career-development/time-management-skills>
6. <https://www.egyankosh.ac.in/bitstream/123456789/97387/1/Unit-10.pdf>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Understand the importance and application of soft skills in personal and professional contexts.
CO-2	Apply life skills such as self-awareness, motivation, and stress management for self-development.
CO-3	Demonstrate employability skills including resume writing, interview preparation, and communication.
CO-4	Apply time management techniques to improve productivity and overcome challenges.
CO-5	Evaluate leadership and teamwork skills in collaborative and organizational settings.

Relationship Matrix:

Semester	Course Code		Title of the Course				Hours	Credits			
III	24USSS31A		SOFT SKILLS				30	2			
Course Outcome s (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	2	1	1	2	1	2	1	1	1	1
CO-2	2	3	2	1	2	1	2	2	2	1	2
CO-3	2	3	2	2	3	1	2	3	2	1	2
CO-4	2	3	3	2	3	2	2	3	3	2	3
CO-5	3	3	3	3	3	2	3	3	3	3	3
Average	2.2	2.8	2.2	1.8	2.6	1.4	2.2	2.4	2.2	1.6	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline

Head of the Department

Semester-III	DESIGN THINKING		24USAS31B			
SEC-IV			L	T	P	C
Hrs./Week: 2	Hrs./Semester:30	Marks:50	2	-	-	2

General Objective

To introduce students to the principles and practices of design thinking as a human-centered approach to innovation and problem solving. The course aims to develop creativity, empathy, critical thinking, and ethical awareness, enabling students to design innovative solutions for real-world challenges across various domains.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals, importance, and characteristics of design thinking and its role in innovation.
LO-2	Apply design thinking frameworks such as the Stanford model and Double Diamond model to identify and define problems effectively.
LO-3	Utilize various tools and techniques like brainstorming, empathy mapping, and storytelling for idea generation and analysis.
LO-4	Develop prototypes, test solutions, and incorporate feedback while considering ethical and inclusive design practices.
LO-5	Analyze real-world applications, sustainability aspects, and case studies of design thinking across multiple domains.

UNIT I INTRODUCTION TO DESIGN THINKING

Introduction to Design Thinking – Meaning and Importance – Creativity and Innovation – Human-Centered Design – Characteristics of a Design Thinker – Need for Design Thinking in the Modern World – Evolution of Design Thinking – Difference between Design Thinking and Traditional Thinking – Benefits of Design Thinking – Applications in Everyday Life.

UNIT II DESIGN THINKING PROCESS AND FRAMEWORKS

Overview of Design Thinking Process – Stanford Five-Stage Model – Empathize – Define – Ideate – Prototype – Test – Double Diamond Model (Discover – Define – Develop – Deliver) – Iteration and Feedback – Problem Identification and Problem Framing – Importance of Empathy in Design.

UNIT III TOOLS AND TECHNIQUES

Brainstorming – Mind Mapping – Empathy Mapping – Persona Development – Stakeholder Mapping – Journey Mapping – Divergent Thinking – Convergent Thinking – Storytelling – Role Playing – Conducting User Interviews – Visualization Techniques.

UNIT IV DESIGN THINKING IN PRACTICE AND ETHICS

Identifying Real-World Problems – Idea Generation Techniques – Concept Selection – Low-Fidelity Prototyping – Testing and Feedback Collection – Introduction to Ethics – Values and Morals in Design – Responsible and Inclusive Innovation – Ethical Issues in Design Practices.

UNIT V APPLICATIONS AND CASE STUDIES

Design Thinking in Education – Healthcare – Business – Social Innovation – Introduction to Sustainability – Sustainable Design Concepts – Simple Case Studies – Future Trends in Design Thinking.

Textbooks:

1. E. Balagurusamy & Bindu Vijayakumar – Design Thinking (Selected simplified chapters)
2. Tim Brown – Change by Design (Selected concepts)

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the concepts, principles, and significance of design thinking in problem solving.
CO-2	Apply design thinking processes to identify, analyze, and define real-world problems.
CO-3	Use design thinking tools and techniques to generate creative and innovative solutions.
CO-4	Develop and test prototypes while incorporating ethical and inclusive design considerations.
CO-5	Evaluate applications of design thinking in various domains with a focus on sustainability and future trends.

Relationship Matrix:

Semester	Course Code		Title of the Course				Hours	Credits			
III	24USAS31B		DESIGN THINKING				30	2			
Course Outcome s (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	2	1	2	1	2	1	1	2	2
CO-2	2	3	2	1	2	2	2	3	1	2	2
CO-3	2	3	2	1	2	2	1	3	1	2	2
CO-4	2	3	2	3	2	3	1	3	1	3	2
CO-5	2	2	3	3	3	3	1	3	2	3	3
Average	2.2	2.6	2.2	1.8	2.2	2.2	1.4	2.6	1.2	2.4	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Mr.K.Ganesh Kumar

Checked by: Dr.V.Roseline

Head of the Department

Semester-III	ADVANCED EXCEL AND POWER BI LAB		24USAS32			
SEC-V			L	T	P	C
Hrs./Week: 2	Hrs./Semester:30	Marks:50	2	-	2	-

General Objective

To provide practical exposure to advanced Excel and Power BI tools for data analysis, visualization, and reporting. The course aims to develop hands-on skills in data manipulation, dashboard creation, and business intelligence techniques to support data-driven decision-making in real-world applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand Excel fundamentals, data types, and formatting techniques for structured data representation.
LO-2	Apply formulas, functions, and logical operations to perform calculations and solve data-related problems.
LO-3	Perform data cleaning and transformation using Excel tools and techniques.
LO-4	Visualize and analyze data using charts, pivot tables, and dashboards.
LO-5	Use Power BI for data transformation, visualization, and report creation for business intelligence applications.

1. Create an Excel workbook, enter sample data, identify data types, apply basic formatting, and save the file properly.
2. Apply basic formulas such as SUM, AVERAGE, COUNT, MIN and MAX, and use relative, absolute and mixed cell references for calculations.
3. Use logical functions IF, IFS, AND and OR to evaluate conditions and display appropriate results.
4. Perform text manipulation using LEFT, RIGHT, MID, LEN, TRIM and CONCAT, and analyze dates using TODAY, NOW and DATEDIF functions.
5. Retrieve data using VLOOKUP, HLOOKUP and XLOOKUP functions, and handle errors using IFERROR.
6. Apply conditional functions COUNTIF, COUNTIFS, SUMIF and SUMIFS, create named ranges, and use data validation to build drop-down lists.

7. Import data from CSV or text files, remove duplicates, clean data using Text to Columns, Flash Fill, and Find and Replace tools.
8. Create and customize column, bar, line and pie charts, including combo charts, to visualize data effectively.
9. Analyze data using pivot tables and pivot charts, apply sorting, filtering and grouping, and design a simple interactive Excel dashboard.
10. Import Excel data into Power BI, perform basic data transformation using Power Query, create visualizations, and develop a simple Power BI report.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Create and format Excel worksheets and apply basic formulas and cell referencing techniques.
CO-2	Apply logical, text, date, and lookup functions to analyze and process data effectively.
CO-3	Perform data cleaning and transformation using Excel tools such as sorting, filtering, and data validation.
CO-4	Create charts, pivot tables, and dashboards for effective data visualization and analysis.
CO-5	Develop basic Power BI reports by importing, transforming, and visualizing data.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
III	24USAS32	ADVANCED EXCEL AND POWER BI LAB					30	2			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	2	2	1	1	3	2	2	1	3	1	2
CO-2	2	3	2	1	3	2	2	2	3	1	2
CO-3	2	3	2	1	3	2	2	2	3	1	2
CO-4	2	3	3	2	3	3	2	3	3	2	3
CO-5	2	3	3	2	3	3	2	3	3	2	3
Average	2	2.8	2.2	1.4	3	2.4	2	2.2	3	1.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Mr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester - IV	QURAN AND HADITH		24ULAR41			
LANG – I			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective: To make the students to develop the skill of basic Arabic Grammar and Translation skills from Arabic to English vice-versa.

Course Objectives

LO	The learners will be able to:
LO 1	Know the importance of Quran and Hadith.
LO 2	Understand the style of Quran and Hadith.
LO 3	Understand the role of Quran and Hadith in the Islamic faith and law.
LO 4	Know the structure of Arabic grammar through the examples from Quran and Hadith.
LO 5	Learn the cultural and moral values.

UNIT I (1-12 verses surah Hujurat) من الآية الأولى إلى الآية الثاني عشر من سورة الحجرات-

UNIT II من الآية الثالثة عشرة إلى الآية الثامنة عشرة من سورة الحجرات و من من الآية " الآية الثانية عشرة إلى - إلى التاسعة عشرة من سورة لقمان

(13-18 verses surah Hujurat& 12-19 verses surah Luqman)

UNIT III – Collection and compilation of Quran and Hadeeth,
History of Imam Abu Hanifa, Malik, Asshafi, Ahmad bin hanbal
History of Imam Bukhari, Muslim, Abu Dawood, At-Tirmidi,
An-Nasaee and Ibn-Majah

UNIT IV من الحديث الأول إلى الحديث العاشر من أحاديث سهلة –

UNIT V من الحديث الحادي عشر إلى الحديث العشرين من أحاديث سهلة –

Textbooks:

1. Tafseer Suratul Hujuraath and from Suraah Luqman (verses from 12-19)

A study material prepared by Dept. of Arabic, Sadakathullah Appa College,
Rahmath Nagar, Tirunelveli-11

2. أحاديث سهلة Ahadeeth Sahlah By Dr. V. Abdur Rahim

Reference Books: Tafsir Al-Jalalain

The Noble Quran, Dr. Muhammad Muhsin Khan and Muhammad Taqi-Ud-Dhin Al-Hilali
الأربعون النووية، شرح أحاديث سهلة الدكتور ش. عبد المالك

Web Reference: 1. <https://quran.com/>

2. <https://sunnah.com/nawawi40www.alnahw.com>

Course Outcomes

CO	Upon completion of this course, students would have learned to:
CO-1	Know the principal textual sources of the Islamic tradition: The Qur'an and the Hadith.
CO-2	Know the role of Quran and Hadith in the synthesis of Islamic faith and practice.
CO-3	Understand the structure of Arabic grammar through Quran and Hadith
CO-4	Understand the methodology of translation of Quran and Hadith 10
CO-5	Understand the moral values of Quran and Hadith

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
IV	24ULAR41	QURAN AND HADITH					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO3	PO 4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	3	3	2	3	1	3	3	2	1	3
CO-2	3	3	3	2	1	1	3	3	2	2	2
CO-3	3	3	3	2	3	2	3	3	2	3	2
CO-4	3	3	3	2	3	1	3	3	2	1	1
CO-5	3	3	3	2	1	3	3	3	2	2	3
Average	3	3	3	2	2.2	1.6	3	3	2	1.8	2.2

STRONG – 3, MEDIUM – 2 , LOW – 1

Prepared by: Dr. J. Ubaiyathulla

Checked by: Dr. J. Ubaiyathulla

Head of the Department

Semester – IV	பொதுத்தமிழ்- 4		24ULTA41			
LANG – I	தமிழும் அறிவியலும்		L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

- தாய்மொழிவழியாக அறிவியல் பற்றிய சிந்தனைகளை வளர்த்தல்.
- அறிவியல் கலைச் சொல்லாக்கம் பற்றிப் பயிற்றுவித்தல்.
- மாணவர்களுக்கு அறிவியல் பார்வையை ஏற்படுத்துதல்.
- தமிழில் அறிவியல் படைப்பிலக்கியங்களை உருவாக்கத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்தபோட்டித் தேர்வுகளுக்கு ஏற்பக் கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

Learning Objectives:

LO	The Learners will be able to:
LO – 1	தாய்மொழிவழியாக அறிவியல் பற்றிச் சிந்திக்கும் திறன் பெற்றிருப்பர்.
LO – 2	அறிவியல் கலைச் சொல்லாக்கம் பற்றியவிதிகள், நுணக்கங்களைத் தெரிந்திருப்பர்.
LO – 3	அறிவியல் தமிழ் வளர்ச்சியில் மொழிபெயர்ப்பின் பங்குகுறித்து அறிந்திருப்பர்.
LO – 4	மொழியறிவோடு சிந்தனைத்திறனைப் பெறுவர்.
LO – 5	மொழிப்பயிற்சிக்குத் தேவையான இலக்கணங்களைக் கற்பர்.

அலகு- 1 தமிழரின் அறிவியல் சிந்தனைகள்

- அறிவியலும் மனிதவாழ்வும்
- ஐந்திணைப் பகுப்பும் சூழலியலும்
- தொழில்நுட்பமேலாண்மை
- நீர் நிலமேலாண்மை

அலகு – 2 பழந்தமிழ் இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. நிலவியல்
2. உலோகவியல்
3. வானவியல்
4. உயிரியல்
5. உளவியல்

அலகு – 3 இடைக்கால இலக்கியங்களில் அறிவியல் சிந்தனைகள்

1. காப்பியங்களில் அறிவியல்
2. சிறநிலக்கியங்களில் அறிவியல்
3. உரைநூல்களில் அறிவியல்

அலகு- 4 இணையத் தமிழ்

1. இணையத் தமிழ் பயன்பாடு – அறிமுகம்

2. இணையத்தமிழ்க் கல்விக்கழகம்
3. இணைய நூலகம்
4. செயற்கைநுண்ணறிவியல்
5. தமிழ்நாட்டுஅறிவியல் ஆளமைகள்

அலகு- 5 கடிதம் எழுதுதலும் கட்டுரைஎழுதுதலும்

- உறவுமுறைக் கடிதப் பயிற்சி
- அலுவலகக் கடிதப் பயிற்சி
- விண்ணப்பப் படிவம் எழுதும் பயிற்சி
- தன் விவரப் படிவம் எழுதும் பயிற்சி
- கருத்து விளக்கக் கட்டுரைகள் எழுதும் பயிற்சி
- பத்திரிகைகளுக்குக் கட்டுரைகள் எழுதும் பயிற்சி

பாட நூல்:

பதிப்பாசிரியர் முனைவர் ச.மகாதேவன், தமிழ்த்துறைத் தலைவர் மற்றும் தமிழ்ப்பாடத்திட்டக் குழுத் தலைவர், பொதுத்தமிழ் - 4, தமிழும் அறிவியலும், சதக்கத்துல்லாஹ் அப்பா கல்லூரி வெளியீடு 2025- 2026 (முதற் பதிப்பு).

பார்வை நூல்கள்

1. தமிழர் வேளாண்மை மரபுகள் - இல.செ.கந்தசாமி
2. சங்க இலக்கியத்தில் வேளாண் சமுதாயம், பெ.மாதையன், நியூ செஞ்சுரி புக் ஹவுஸ்
3. தமிழில் அறிவியல் இதழ்கள் சாமுவேல் - ரா.பார்வேந்தன் .:பிஷ்கிநீன் பதிப்பகம், கோவை.
4. அறிவியல் தமிழ் - பதிப்பாசிரியர் இராதா செல்லப்பன், பாரதிதாசன் பல்கலைக்கழகம், திருச்சிராப்பள்ளி.
5. இணையத் தமிழ் வரலாறு, மு.பொன்னவைக்கோ, பாரதிதாசன் பல்கலைக்கழகம்
6. இணையத் தமிழ், சந்திரிகா சுப்பிரமணியம் - சந்திரோதயம் பதிப்பகம்
7. இணையமும் இனியதமிழும் - துரை. மணியரசன், இசை பதிப்பகம்
8. கணினித் தமிழ், இல. சுந்தரம் - விகடன் பிரசுரம்
9. மாண்புமிகு மண், பாமயன், வம்சிபுக்ஸ்
10. தமிழ் இலக்கியத்தில் அறிவியல் சிந்தனைகள், வானதி பதிப்பகம், சென்னை.

- <https://www.chennaiLibrary.com/>
- <https://www.sirukathaigal.com>
- <https://www.tamilvirtualuniversity.org>

- <https://www.noolulagam.com>
- <https://www.katuraitamilblogspot.com>

Course Outcomes

CO	Upon completion of this course, students will be able to
CO-1	தாய்மொழி வழியாக அறிவியல் பற்றிச் சிந்திக்கும் திறன் பெற்றிருப்பர்.
CO-2	அறிவியல் கலைச் சொல்லாக்கம் பற்றிய விதிகள், நுணக்கங்களைத் தெரிந்திருப்பர்.
CO-3	அறிவியல் தமிழ் வளர்ச்சியில் மொழிபெயர்ப்பின் பங்கு குறித்து அறிந்திருப்பர்.
CO-4	மொழியறிவோடு சிந்தனைத்திறனைப் பெறுவர்.
CO-5	மொழிப்பயிற்சிக்குத் தேவையான இலக்கணங்களைக் கற்பர்.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
IV	24ULTA41	தமிழக வரலாறும் பண்பாடும்					90	3			
Course Outcomes (Cos)	Programme Outcomes (Pos)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	3	2	3	3	3	2	3	3	3	2	3
CO-2	3	3	2	2	2	3	2	2	3	2	2
CO-3	3	2	3	3	2	2	3	3	2	3	3
CO-4	3	3	3	2	2	2	3	2	3	2	2
CO-5	3	3	2	2	2	3	3	2	2	2	2
Average	3	2.6	2.6	2.4	2.2	2.4	2.8	2.4	2.6	2.2	2.4

3 - STRONG, 2 - MEDIUM, 1- LOW

Prepared by :Dr. A.S. Shaik Sindha

Checked by:

Dr.S.Mahadevan

Head of the Department

Semester – IV	GENERAL ENGLISH IV		24ULEN41			
Lang- II			L	T	P	C
Hrs./Week: 6	Hrs./Semester : 90	Marks :100	6	-	-	3

General Objective:

To enable students set clear and achievable goals, to understand the value of integrity, be emotionally intelligent and to develop communication skills for their professional development.

Learning Objectives (LOs)

LO	The learners will be able to:
LO-1	Help them imbibe goal-setting attitude.
LO-2	Enable them to understand the value of integrity.
LO-3	Help them identify and overcome emotions.
LO-4	Teach them to frame sentences using tenses.
LO-5	Train them to enhance reporting skills.

Unit – I

Skills and Virtues focussed: Goal Setting (UNICEF)

Life Story

From Chinese Cinderella – Adeline Yen Mah (Chapter 9 – Chinese New Year)

Why I Write - George Orwell

Short Essay

On the Love of Life – William Hazlitt

Unit – II

Skills and Virtues focussed: Integrity

Short Story

The Taxi Driver – K.S. Duggal

Kabuliwala - Rabindranath Tagore

A Retrieved Reformation – O. Henry

Extract from a play

The Quality of Mercy (Act IV, Scene I - Lines 190-210) (Trial Scene from the *Merchant of Venice* by Shakespeare)

Unit – III

Skills and Virtues focussed: Coping with Emotions

Poetry

Pride – Dahlia Ravikovitch

Phenomenal Woman – Maya Angelou

Reader's Theatre

The Giant's Wife: A Tall Tale of Ireland – William Carleton

The Princess and the God: A Tale of Ancient India – Aaron Shepherd

Unit – IV

Skill focussed: Language Competency

Simple Sentences
Compound Sentences
Complex Sentences
Direct and Indirect Speech

Unit - V

Skill focussed: Writing Skills

Report Writing

Narrative Report
Newspaper Report

Drafting Speeches

Welcome Address
Vote of Thanks

Assignment: On Personal Mastery – Robin Sharma (**Short Story**)

Note: Questions should not be framed from the pieces / topics prescribed for Seminar or Assignments.

Textbooks:

1. Eastwood, John. *Oxford Practice Grammar*. Oxford University Press, 2003.
2. Carter, Ronald, and Michael McCarthy. *Cambridge Grammar of English*. Cambridge University Press, 2006.
3. Orwell, George. *George Orwell Essays*. Penguin Classics, 2000.
4. Green, David. *Contemporary English Grammar Structures and Composition*. Laxmi Publications, 2015.
5. Pillai, G. Radhakrishna, et al. *Written English for You*. Emerald Publishers, 1982.

Web Sources:

1. Adeline, Yen Mah. *Chinese Cinderella*. - https://cdnsm5-ss2.sharpschool.com/UserFiles/Servers/Server_5607714/File/SCSD/2021-2022/12th%20-%20Chinese%20Cinderella.pdf
2. Orwell, George. *Why I Write*.
<https://srjcstaff.santarosa.edu/~mheydon/whywriteD.pdf>
3. Hazlitt, William. *On the Love of Life*.
<http://www.blupete.com/Literature/Essays/Hazlitt/RoundTable/LoveLife.htm>
4. Tagore, Rabindranath. *Kabuliwala*. Translated by Mohammad Qyaum,
[https://www.ssgopalganj.in/online/E-Books/CLASS%20VI/Kabuliwala%20\(English%20Translation\)%20by%20Mohammad%20Qyaum.pdf](https://www.ssgopalganj.in/online/E-Books/CLASS%20VI/Kabuliwala%20(English%20Translation)%20by%20Mohammad%20Qyaum.pdf)

5. O. Henry. *A Retrieved Reformation*.
https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf
6. Shakespeare, William. *The Merchant of Venice*. https://folger-main-site-assets.s3.amazonaws.com/uploads/2022/11/the-merchant-of-venice_PDF_FolgerShakespeare.pdf

Course Outcomes

CO	Upon completion of this course, students would have learnt to :
CO-1	Determine their goals.
CO-2	Identify the value of integrity within teams, organizations, or communities.
CO-3	Understand and apply effective coping strategies to manage stress, anxiety and other emotions.
CO-4	Frame grammatically correct sentences.
CO-5	Write cohesive reports

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
IV	24ULEN41	GENERAL ENGLISH - IV					90	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	2	3	3	3	1	1	3	3	3	2	2
CO-2	2	3	3	3	2	1	3	3	3	3	2
CO-3	2	3	3	3	3	1	3	3	3	3	2
CO-4	2	3	3	3	2	1	3	3	2	2	1
CO-5	2	3	3	3	2	1	3	3	2	2	1
Average	2	3	3	3	2	1	3	3	2.6	2.4	1.6

STRONG – 3, MEDIUM – 2 , LOW – 1

Prepared by:

Dr. L. Faustina Leo
Head (Shift I – Unaided)

Checked by:

Dr. S. Mohamed Haneef
Head of the Department

Semester-IV	DATA SCIENCE		24UCAS41			
Core-IV			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks: 100	5	-	-	5

General Objective

To provide a comprehensive foundation in data science by introducing data concepts, programming with R, data collection, preprocessing techniques, and statistical methods. The course aims to develop analytical thinking and equip students with the skills required to extract meaningful insights from data for decision-making in real-world applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of data science, its lifecycle, types of data, and roles in the data science domain.
LO-2	Apply basic R programming concepts, including data structures, control statements, and visualization techniques.
LO-3	Identify various data sources, types, and data quality issues, and understand sampling techniques.
LO-4	Perform data preprocessing and transformation techniques including cleaning, normalization, and feature selection.
LO-5	Apply statistical concepts such as descriptive statistics, probability, and hypothesis testing in data analysis.

UNIT I INTRODUCTION TO DATA SCIENCE

Definition and scope of Data Science – Evolution of Data Science – Data Science vs Data Analytics vs Business Analytics vs Artificial Intelligence vs Machine Learning – Types of data: structured, semi-structured, and unstructured – Data Science lifecycle – Roles in Data Science: Data Analyst, Data Scientist, Machine Learning Engineer – Applications of Data Science across domains such as healthcare, finance, education, and scientific research.

UNIT II INTRODUCTION TO R PROGRAMMING FOR DATA SCIENCE

Introduction to R Programming – Features and advantages of R – Installing R and RStudio – R environment and workspace – Basic syntax and data types – Variables and operators – Control structures: if, if-else, for loop, while loop – Functions in R (built-in and user-defined) – R data structures: vectors, matrices, arrays, lists, and data frames – Basic input and output

operations – Introduction to packages and libraries – Basic data visualization using R (bar chart, histogram, box plot).

UNIT III DATA COLLECTION AND DATA TYPES

Sources of data: databases, sensors, logs, and web data (conceptual overview) – Primary data and secondary data – Qualitative and quantitative data – Categorical and numerical data – Discrete and continuous data – Data quality issues – Introduction to data sampling concepts and basic sampling methods.

UNIT IV DATA PREPROCESSING AND DATA PREPARATION

Importance of data preprocessing – Data cleaning concepts: handling missing data, noise, and inconsistencies – Steps involved in data preprocessing – Data transformation concepts – Data normalization and standardization – Feature selection vs feature extraction – Introduction to data wrangling – Outlier detection and handling.

UNIT V STATISTICAL FOUNDATIONS FOR DATA SCIENCE

Role of statistics in Data Science – Descriptive statistics (conceptual understanding) – Measures of central tendency – Measures of dispersion – Basics of probability – Random variables – Common probability distributions: normal and binomial – Correlation vs causation – Introduction to hypothesis testing (conceptual overview).

TEXT BOOKS:

1. Grus, Joel. Data Science from Scratch. First Edition. Sebastopol, CA: O'Reilly Media, Inc., 2015.
2. Vitrià, Jordi, Puertas, Eloi., Introduction to Data Science: A Python Approach to Concepts, Techniques and Applications. Springer International Publishing, 2017.
3. Peter Bruce, Andrew Bruce “Practical Statistics for Data Scientists”, O'Reilly Media, Inc., 2017.

REFERENCE BOOKS:

1. Rafael A. Irizarry, “Introduction to Data Science: Data Analysis and Prediction Algorithms with R”, Chapman and Hall/CRC, 2019.
2. Downey, Allen B. Think Stats: Probability and Statistics for Programmers. Version 1.6.0. Needham, MA: Green Tea Press, 2011.

WEB LINK:

1. <https://www.simplilearn.com/data-science-course-syllabus-subjects-article>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the concepts, lifecycle, and applications of data science.
CO-2	Apply R programming techniques for data manipulation and basic visualization.
CO-3	Analyze different types and sources of data and identify data quality issues.
CO-4	Perform data preprocessing, transformation, and feature engineering techniques.
CO-5	Apply statistical methods to analyze data and support decision-making.

Relationship Matrix:

Semester	Course Code	Title of the Course					Hours	Credits			
IV	24UCAS41	DATA SCIENCE					75	5			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	2	3	2	1	3	2	2	2	3	1	2
CO-3	2	3	2	1	2	2	3	2	2	1	2
CO-4	2	3	2	2	3	3	3	3	3	2	3
CO-5	2	3	3	2	3	3	2	3	3	2	3
Average	2.2	2.8	2	1.4	2.6	2.4	2.6	2.2	2.6	1.4	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Mr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-IV	DATA SCIENCE LAB		24UCAS4P			
Core-P-IV			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks: 100	3	-	3	

General Objective

To provide hands-on experience in data analysis using R programming by applying techniques such as data preprocessing, exploratory data analysis, statistical analysis, and visualization. The course aims to develop practical skills in interpreting data, drawing insights, and supporting data-driven decision-making.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Perform exploratory data analysis (EDA) using summary statistics and visualization techniques.
LO-2	Apply data preprocessing techniques including handling missing values, outlier detection, and normalization.
LO-3	Implement sampling methods and analyze statistical variability in datasets.
LO-4	Apply statistical techniques such as correlation analysis and hypothesis testing.
LO-5	Interpret data and generate meaningful insights using R programming for real-world datasets.

1. Write an R program to perform complete exploratory data analysis (EDA) on a dataset and interpret statistical insights using summary statistics, correlation matrix, and visualizations.
2. Write an R program to handle missing values using deletion and imputation methods and compare their impact on statistical measures.
3. Write an R program to detect outliers using the IQR method and analyze how removing them affects mean and variance.
4. Write an R program to apply Min-Max normalization and Z-score standardization and compare the transformed distributions.
5. Write an R program to implement simple random sampling and analyze sampling variability by comparing sample statistics with population statistics.
6. Write an R program to compute and visualize correlation between numerical variables and interpret the relationship.
7. Write an R program to simulate a probability experiment and compare experimental probability with theoretical probability.

8. Write an R program to perform a two-sample t-test and interpret the statistical significance of the results.
9. Write an R program to generate a data quality assessment report including missing values, duplicates, and summary statistics.
10. Write an R program to analyze the relationship between categorical and numerical variables using grouped statistics and appropriate visualizations.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Perform exploratory data analysis and interpret statistical insights using R.
CO-2	Apply data preprocessing techniques such as handling missing values, outlier detection, and normalization.
CO-3	Implement sampling and probability experiments to analyze data variability.
CO-4	Apply statistical methods including correlation analysis and hypothesis testing.
CO-5	Analyze datasets and generate meaningful insights using visualization and statistical interpretation.

Relationship Matrix:

Semester	Course Code	Title of the Course						Hours	Credits		
IV	24UCAS4P	DATA SCIENCE LAB						45	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	2	2	2	2	3	1	2
CO-2	2	3	2	1	2	2	2	2	3	1	2
CO-3	2	3	2	1	2	2	2	2	3	1	2
CO-4	2	3	2	1	2	2	2	3	3	1	2
CO-5	2	3	3	2	2	3	2	3	3	2	3
Average	2	3	2.2	1.2	2	2.2	2	2.4	3	1.2	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Mr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-IV	COMPUTER VISION		24UAAS41			
EC-T-IV(Allied)			L	T	P	C
Hrs./Week: 4	Hrs./Semester: 60	Marks: 100	4	-	-	4

General Objective

To provide a comprehensive understanding of computer vision concepts, image processing techniques, and vision-based applications. The course aims to equip students with the knowledge to analyze digital images, extract meaningful features, and develop intelligent vision systems for real-world applications in Artificial Intelligence and Data Science.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of computer vision, image representation, and color models.
LO-2	Apply image processing and enhancement techniques including filtering, edge detection, and thresholding.
LO-3	Analyze image transformations and extract features for segmentation and pattern recognition.
LO-4	Implement object detection, motion analysis, and understand deep learning concepts in computer vision.
LO-5	Evaluate real-world applications of computer vision and understand ethical and societal implications.

UNIT I Introduction to Computer Vision & Image Fundamentals

Introduction to Computer Vision –Applications-Human vision vs computer vision -Digital image representation -Image types: grayscale, color, binary -Image acquisition and sampling-Color models: RGB, HSV, Grayscale

UNIT II Image Processing and Enhancement

Image enhancement concepts-Point processing operations - Histogram computation and histogram equalization-Image filtering: smoothing and sharpening -Spatial filters: mean, Gaussian - Noise types and noise reduction using median filter-Edge detection basics: Sobel, Prewitt, Canny - Thresholding techniques

UNIT III Image Transformations and Feature Extraction

Geometric transformations: translation, rotation, scaling- Affine and perspective transformations Feature detection concepts -Corners and edges - Feature descriptors --Image segmentation concepts -Contour detection and analysis.

UNIT IV Object Detection and Motion Analysis

Template matching -Object detection concepts -Classical object detection methods -Face detection using Haar Cascades -Motion detection basics - Background subtraction - Introduction to image classification pipeline -Introduction to CNNs for vision

UNIT V Vision Applications and Case Studies

Image classification pipeline -Optical Character Recognition (OCR) – overview -Video processing fundamentals - Ethical and social issues in Computer Vision -Applications in healthcare, surveillance, autonomous systems

TEXT BOOKS

1. **Digital Image Processing** (4th Edition, 2018) - Rafael C. Gonzalez, Richard E. Woods, Pearson, ISBN: 9780133356724
2. **Computer Vision: Algorithms and Applications** (2nd Edition, 2022) - Richard Szeliski, Springer, ISBN: 9783030343712 (Free online: szeliski.org/Book/)
3. **Learning OpenCV 4 Computer Vision with Python 3** (3rd Edition, 2020) - Joseph Howse, Joe Minichino, Packt Publishing, ISBN: 9781789531619

REFERENCE BOOKS

1. **Computer Vision: A Modern Approach** (2nd Edition, 2012) - David Forsyth, Jean Ponce, Pearson, ISBN: 9780136085928
2. **Programming Computer Vision with Python** (2012) - Jan Erik Solem, O'Reilly, ISBN: 9781449316549
3. **Practical Python and OpenCV** (4th Edition, 2021) - Adrian Rosebrock, PyImageSearch
4. **Multiple View Geometry in Computer Vision** (2nd Edition, 2004) - Richard Hartley, Andrew Zisserman, Cambridge University Press

WEB LINKS AND ONLINE RESOURCES

1. OpenCV Official Documentation: <https://docs.opencv.org/>
2. PyImageSearch Tutorials: <https://pyimagesearch.com/>
3. Computer Vision: Algorithms and Applications (Free): <http://szeliski.org/Book/>
4. LearnOpenCV: <https://learnopencv.com/>
5. OpenCV Python Tutorial: <https://opencv-python-tutroals.readthedocs.io/>
6. Stanford CS231n Course Notes: <http://cs231n.stanford.edu/>
7. Kaggle Computer Vision Competitions and Datasets

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamentals of computer vision and digital image representation.
CO-2	Apply image processing techniques such as filtering, enhancement, and edge detection.
CO-3	Analyze image transformations and perform feature extraction and segmentation.
CO-4	Implement object detection and understand motion analysis and CNN-based approaches.
CO-5	Evaluate computer vision applications and ethical issues in real-world scenarios.

Relationship Matrix:

Semester	Course Code		Title of the Course					Hours		Credits	
IV	24UAAS41		COMPUTER VISION					60		4	
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	2	3	2	1	2	2	3	2	3	1	2
CO-3	2	3	2	1	2	2	3	2	3	1	2
CO-4	2	3	2	2	3	3	2	3	3	2	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2	1.6	2.4	2.4	2.6	2.2	2.8	1.6	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-IV	COMPUTER VISION LAB		24UAAS4P			
EC-P-IV			L	T	P	C
Hrs./Week: 2	Hrs./Semester: 30	Marks:50	2	-	1	-

General Objective

To provide hands-on experience in image processing and computer vision techniques using programming tools. The course aims to develop practical skills in analyzing images, extracting features, and implementing vision-based algorithms for real-world applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand and perform basic image operations including color space conversions and pixel manipulation.
LO-2	Apply image enhancement and filtering techniques for noise reduction and quality improvement.
LO-3	Implement edge detection, segmentation, and feature detection techniques.
LO-4	Perform geometric transformations and analyze image features such as contours and corners.
LO-5	Develop basic computer vision applications including face detection, motion detection, and image classification.

1. Program to perform color space conversions, including RGB to Grayscale and RGB to HSV transformations.
2. Program to study basic image properties and perform simple pixel-level operations, such as accessing, modifying, and manipulating pixel values.
3. Program to visualize image histograms and perform histogram equalization for image enhancement.
4. Program to apply image smoothing techniques and noise removal methods, including averaging, Gaussian, and median filtering.
5. Program to detect edges in images using Sobel and Canny edge detection algorithms.
6. Program to implement thresholding techniques and perform simple image segmentation.

7. Program to perform geometric transformations on images, including rotation, scaling, and perspective transformation.
8. Program to detect corners in images using Harris and Shi-Tomasi corner detection methods.
9. Program to perform contour detection and shape analysis, including area and perimeter calculation.
10. Program to detect human faces in images using the Haar Cascade classifier.
11. Program to implement motion detection using background subtraction techniques in video sequences.
12. Program to perform simple image classification using extracted visual features.
13. Program to process video frames, including frame extraction and applying image processing operations on video streams.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Perform basic image processing operations including color conversion and pixel manipulation.
CO-2	Apply filtering, enhancement, and edge detection techniques to improve image quality.
CO-3	Implement segmentation, feature detection, and contour analysis techniques.
CO-4	Perform geometric transformations and analyze image features.
CO-5	Develop basic computer vision applications such as face detection, motion detection, and classification.

Relationship Matrix:

Semester	Course Code	Title of the Course					Hours	Credit			
IV	24UAAS4P	COMPUTER VISION LAB					2	1			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	2	2	2	2	3	1	2
CO-2	2	3	2	1	2	2	2	2	3	1	2
CO-3	2	3	2	1	2	2	2	2	3	1	2
CO-4	2	3	2	1	2	2	2	2	3	1	2
CO-5	2	3	3	2	2	3	2	3	3	2	3
Average	2	3	2.2	1.2	2	2.2	2	2.2	3	1.2	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-IV	HUMAN COMPUTER INTERFACE		24USAS41			
SEC-VI			L	T	P	C
Hrs./Week:2	Hrs./Semester:30	Marks: 50	2	-	-	2

General Objective

To provide a comprehensive understanding of human-computer interaction principles, design methodologies, and usability concepts. The course aims to develop the ability to design user-friendly, efficient, and interactive systems by considering human factors, cognitive processes, and modern interface technologies.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of HCI, including human factors, computer systems, interaction models, and ergonomics.
LO-2	Apply design principles, usability engineering, and evaluation techniques in developing interactive systems.
LO-3	Analyze cognitive, communication, and socio-organizational models in HCI design.
LO-4	Explore mobile HCI concepts, design elements, and application development frameworks.
LO-5	Design effective web interfaces using modern interaction techniques and usability principles.

Unit I Foundations Of HCI

The Human: I/O channels – Memory -Reasoning and problem solving;
The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms. - Case Studies

Unit II Design& Software Process

Interactive Design: Basics – process – scenarios - Navigation: screen design Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design

Unit III Models And Theories

HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models- Hypertext, Multimedia and WWW.

Unit IV Mobile HCI

Mobile Ecosystem: Platforms, Application frameworks - Types of Mobile Applications: Widgets, Applications, Games - Mobile Information Architecture, Mobile 2.0 - Mobile Design: Elements of Mobile Design, Tools. - Case Studies.

Unit V Web Interface Design

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, *"Human -Computer Interaction"*,

III Edition, Pearson Education, 2004 (UNIT I, II & III).

2. Brian Fling, *"Mobile Design and Development"*, I Edition, O'Reilly Media Inc., 2009(UNIT-IV).

3. Bill Scott and Theresa Neil, *"Designing Web Interfaces"*, First Edition, O'Reilly, 2009. (UNIT-V).

REFERENCE BOOKS:

1. Shneiderman, *"Designing the User Interface: Strategies for Effective Human-Computer Interaction"*, V Edition, Pearson Education.

WEBSITE AND E-LEARNING SOURCES

1. <https://www.interaction-design.org/literature/topics/human-computer-interaction>.

2. https://link.springer.com/10.1007/978-0-387-39940-9_192

3. https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the fundamental concepts of HCI, including human factors, interaction models, and system components.
CO-2	Apply design principles and usability engineering techniques to develop interactive systems.
CO-3	Analyze cognitive and communication models for improving user interaction and system design.
CO-4	Evaluate mobile HCI systems and design user-friendly mobile interfaces.
CO-5	Design and evaluate web interfaces using modern interaction techniques and usability standards.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours		Credits		
IV	24USAS41		HUMAN COMPUTER INTERFACE					30		2		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	1	2	2	2	1	1	2	2	
CO-2	2	3	2	1	2	2	2	3	1	2	2	
CO-3	2	3	2	1	2	2	2	2	1	2	2	
CO-4	2	3	2	2	2	2	1	3	1	2	2	
CO-5	2	3	3	2	3	3	1	3	2	2	3	
Average	2.2	2.8	2.2	1.4	2.2	2.2	1.6	2.4	1.2	2	2.2	

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester – IV	ENVIRONMENTAL STUDIES		24UENS41			
EVS			L	T	P	C
Hrs./Week: 2	Hrs./Semester : 30	Marks :50	2	-	-	2

UNIT 1:

Multidisciplinary Nature of Environmental Studies and Natural Resources:

Definition, scope and importance, Need for public awareness. Concept of Renewable and non-renewable resources. Forest resources: Benefits and over-exploitation, deforestation, mining, dams and their effects on forest. Water resources: Use and over-utilization of surface and ground water, floods, drought and problems. Energy resources: Growing energy needs, uses of alternate energy sources. Land resources : Land degradation, man induced landslides, soil erosion and desertification.

UNIT 2:

Ecosystems:

Concept of an ecosystem. Structure and function of an ecosystem. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem- a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, rivers, oceans).

UNIT 3:

Biodiversity and its Conservation:

Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Biodiversity at global, National and local levels. Hot-spots of biodiversity - Western Ghats (Kalakkad, Mundanthurai Tiger reserve, Anamalai hills, Nilgiri biosphere reserve). Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

UNIT 4:

Environmental Pollution:

Air pollution - Definition, causes, effects and control measures - Climate change, global warming, acid rain, ozone layer depletion. Water pollution-Definition, causes, effects and control measures. Noise pollution-Definition, causes, effects and control measures. Soil pollution.-Definition, causes, effects and control measures- Nuclear hazards and nuclear accidents – The Chernobyl Nuclear Disaster – Nuclear Reactors in India - Kaiga Atomic Power Station(2009), Karnataka; Kakrapar Atomic Power Station (2016)., Gujarat; Kudankulam Nuclear Power Plant.

UNIT 5:

Environmental Impact Assessment and Environment protection Act :

Aim and objectives of Environmental Impact Assessment- Wildlife Protection Act, 1972 amendments 1991, Forest Conservation Act, 1980, Indian Forest Act, Revised 1982. Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975. Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986. The Solid Waste Management Rules, 2016, Noise Pollution (Regulation 9 and Control) Rules, 2000.

Text Book:

Dr.A.Syed Mohamed, Dr.M.I. Zahir Hussain and Dr. K.Chitra, 2026, Environmental Studies, Sadakathullah Appa College, Tirunelveli.

Reference Books

1. Erach Bharucha, 2021, Textbook of Environmental Studies for Undergraduate Courses, Third Edition, Orient blackswanPvt. Ltd., Hyderabad.
2. M. Basu, and S. Xavier, 2016, Fundamentals of Environmental Studies, Cambridge, University Press.
3. A.K. Mitra and R. Chakraborty, 2016, Introduction to Environmental Studies, Book Syndicate.
4. N. Arumugam and V. Kumaresan, 2014, Environmental studies, 4th edition, Saras Publication, Nagercoil, TamilNadu.
5. J.S. Singh, S.P.Singh, and S.R. Gupta, 2014, Ecology, Environmental Scienceand Conservation. S. Chand Publishing, New Delhi.
6. G.S. Vijayalakshmi, A.G. Murugesan and N.Sukumaran, 2006. Basics of Environmental Sciences, Manonmaniam Sundaranar University Publications, Tirunelveli.

SEMESTER V

Semester-V	LARGE LANGUAGE AND VISION MODEL		24UCAS51			
Core-V			L	T	P	C
Hrs./Week: 6	Hrs./Semester: 90	Marks:100	6	-	-	5

General Objective

To provide a comprehensive understanding of large-scale AI models, including Large Language Models (LLMs), vision models, and multimodal systems. The course aims to equip students with foundational knowledge of deep learning architectures, model capabilities, ethical considerations, and real-world applications, enabling them to understand and apply modern AI technologies in data-driven environments.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the evolution of AI models, representation learning, and the emergence of large-scale models including LLMs and vision models.
LO-2	Explain the fundamentals of natural language processing, transformer architecture, and the working principles of large language models.
LO-3	Analyze vision models including CNNs and Vision Transformers, and understand their applications in real-world scenarios.
LO-4	Explore multimodal AI systems combining text and vision, and analyze their applications and challenges.
LO-5	Evaluate practical aspects such as deployment, tools, ethical considerations, and future trends in large AI models.

UNIT I FOUNDATIONS OF LARGE AI MODELS

Introduction to Artificial Intelligence and Deep Learning – Evolution from Traditional Machine Learning to Deep Learning – Limitations of Traditional Models – Emergence of Large-Scale Models – Concept of Representation Learning – Overview of Large Language Models (LLMs) and Vision Models – Applications of LLMs and Vision Models in real-world systems – Challenges and ethical considerations of large AI models.

UNIT II FUNDAMENTALS OF LARGE LANGUAGE MODELS (LLMs)

Introduction to Natural Language Processing (NLP) – Text data representation: tokens, embeddings, and vocabularies – Language modeling concept – Evolution from n-gram models to neural language models – Introduction to Transformer architecture – Self-attention mechanism – Overview of popular LLMs (GPT, BERT, T5) – Prompting basics and use cases of LLMs – Limitations and biases in LLMs.

UNIT III FUNDAMENTALS OF VISION MODELS

Introduction to Computer Vision – Image representation and pixels – Feature extraction in images – Introduction to Convolutional Neural Networks (CNNs) – Basic CNN architecture: convolution, pooling, and fully connected layers – Introduction to Vision Transformers (ViT) – Popular vision models (ResNet, YOLO) – Applications of vision models in healthcare, surveillance, autonomous systems, and smart devices.

UNIT IV MULTIMODAL MODELS AND APPLICATIONS

Introduction to Multimodal Learning – Need for combining text and vision – Vision–Language Models (VLMs) – Concept of image captioning and visual question answering – Overview of models such as CLIP and multimodal LLMs – Use cases: chatbots with images, document understanding, smart assistants – Challenges in multimodal systems – Ethical and societal issues in multimodal AI.

UNIT V PRACTICAL PERSPECTIVES, TOOLS, AND FUTURE TRENDS

Introduction to AI model deployment concepts– Overview of tools and ecosystems for LLMs and vision models (Python libraries, APIs) – Pre-trained models and transfer learning – Responsible AI practices – Data privacy and security considerations – Industry applications and career roles related to LLMs and Vision Models – Future trends in foundation models and generative AI.

TEXT BOOKS

1. Raschka, S., *Build a Large Language Model (From Scratch)*, Manning Publications, USA, 2024.
2. Rothman, D., *Transformers for Natural Language Processing and Computer Vision*, Packt Publishing, Birmingham, 2023.
3. Alammari, J. and Narkhede, S., *Hands-On Large Language Models*, O'Reilly Media, USA, 2024.

REFERENCE BOOKS

1. Jurafsky, D. and Martin, J. H., *Speech and Language Processing*, 3rd Edition (Draft), Pearson Education, USA, 2023.
2. Szeliski, R., *Computer Vision: Algorithms and Applications*, 2nd Edition, Springer, New York, 2022.
3. Goodfellow, I., Bengio, Y., and Courville, A., *Deep Learning*, MIT Press, Cambridge, 2016.
4. Huyen, C., *AI Engineering: Building Applications with Foundation Models*, O'Reilly Media, USA, 2023.

ONLINE RESOURCES

1. Vaswani et al., “Attention Is All You Need”, *Proceedings of NeurIPS*, 2017.
2. OpenAI, Google AI, and Meta AI official documentation and research blogs.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the evolution, concepts, and applications of large AI models.
CO-2	Explain the fundamentals of LLMs including NLP concepts and transformer architecture.
CO-3	Analyze vision models such as CNNs and Vision Transformers for image-based tasks.
CO-4	Evaluate multimodal AI systems and their real-world applications.
CO-5	Assess deployment strategies, ethical issues, and future trends in large AI models.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
V	24UCAS51	LARGE LANGUAGE AND VISION MODEL					90	5			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	3	3	2	1	2	2	3	2	3	1	2
CO-3	2	3	2	1	3	2	3	3	3	1	2
CO-4	2	3	2	2	2	2	3	2	2	2	2
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.4	2.8	2	1.6	2.4	2.2	2.8	2.2	2.6	1.6	2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	DEEP LEARNING		24UCAS52			
Core-VI			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks:100	5	-	-	4

General Objective

To provide a comprehensive understanding of deep learning concepts, neural network architectures, and training methodologies. The course aims to equip students with the knowledge to design, train, and evaluate deep neural networks and apply them to real-world problems in areas such as computer vision, natural language processing, and time-series analysis.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of deep learning, neural network models, and activation functions.
LO-2	Apply neural network training techniques including forward propagation, backpropagation, and optimization methods.
LO-3	Analyze deep neural networks and regularization techniques to improve model performance.
LO-4	Explore convolutional neural networks (CNNs) and their applications in image processing tasks.
LO-5	Understand sequence models such as RNN, LSTM, and GRU, and their applications in real-world scenarios.

UNIT I INTRODUCTION TO DEEP LEARNING

Artificial Intelligence, Machine Learning, and Deep Learning – Differences – Why deep learning – Biological neuron vs artificial neuron – Perceptron model – Limitations of single-layer perceptron – Multilayer perceptron (MLP) – Activation functions – Step – Sigmoid – Tanh – ReLU – Overview of deep learning applications.

UNIT II NEURAL NETWORK TRAINING BASICS

Architecture of a neural network – Forward propagation – Loss functions – Mean squared error – Cross-entropy loss – Gradient descent – Batch – Stochastic – Mini-batch – Backpropagation algorithm – Learning rate and optimization challenges – Model evaluation metrics.

UNIT III DEEP NEURAL NETWORKS & REGULARIZATION

Deep feedforward neural networks – Overfitting and underfitting – Bias-variance trade-off – Regularization techniques – L1 and L2 regularization – Dropout – Weight initialization – Batch normalization – Introduction to optimizers – Momentum – RMSProp – Adam.

UNIT IV CONVOLUTIONAL NEURAL NETWORKS (CNNs)

Introduction to CNN – Convolution operation – Filters and feature maps – Padding and stride – Pooling – Max pooling – Average pooling – CNN architecture – LeNet overview – Applications of CNN – Image classification – Object detection .

UNIT V SEQUENCE MODELS & DEEP LEARNING APPLICATIONS

Introduction to sequential data – Recurrent neural networks (RNN) – Problems with RNN – Long short-term memory (LSTM) – Gated recurrent unit (GRU) – Applications of sequence models – Text processing – Time series prediction – Ethics and challenges in deep learning – Case studies.

TEXT BOOKS

1. Ian Goodfellow, YoshuaBengio, and Aaron Courville, *Deep Learning*, MIT Press, 2016.
2. François Chollet, *Deep Learning with Python*, 2nd Edition, Manning Publications, 2021.

REFERENCE BOOKS

1. AurélienGéron, *Hands-On Machine Learning with Scikit-Learn, Keras&TensorFlow*, 2nd Edition, O'Reilly Media, 2019.
2. Michael Nielsen, *Neural Networks and Deep Learning*, Determination Press, 2015.
3. Simon Haykin, *Neural Networks and Learning Machines*, 3rd Edition, Pearson Education, 2009.
4. C. M. Bishop, *Pattern Recognition and Machine Learning*, Springer, 2006.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the concepts of deep learning, neural networks, and activation functions.
CO-2	Apply neural network training techniques including forward and backward propagation.
CO-3	Analyze deep neural networks and apply regularization techniques to improve performance.
CO-4	Implement convolutional neural networks for image-based applications.
CO-5	Evaluate sequence models and their applications in text and time-series data.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
V	24UCAS52	DEEP LEARNING					75	4			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	2	3	2	1	2	2	3	2	3	1	2
CO-3	2	3	2	2	2	3	3	2	3	2	2
CO-4	2	3	2	1	3	3	2	3	3	1	3
CO-5	2	3	3	2	3	3	2	3	3	2	3
Average	2.2	2.8	2	1.4	2.4	2.6	2.6	2.2	2.8	1.4	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	SOFTWARE ENGINEERING FOR DATA SCIENCE		24UCAS53			
Core-VII			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks:100	5	-	-	4

General Objective

To provide a comprehensive understanding of software engineering principles tailored for data science applications. The course aims to equip students with the knowledge to develop reliable, maintainable, and scalable data-driven systems by integrating programming practices, system design, testing, performance optimization, and ethical considerations.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the role of software engineering in data science and apply principles of clean, maintainable, and well-documented code.
LO-2	Analyze the use of data structures and programming paradigms for efficient data processing and system design.
LO-3	Apply error handling, logging, debugging, and testing techniques in data science workflows.
LO-4	Evaluate performance, design modular systems, and apply refactoring techniques for scalable software development.
LO-5	Understand collaboration tools, deployment concepts, version control, and ethical practices in data science software development.

UNIT I Foundations Of Software Engineering For Data Science

Role of software engineering in Data Science – Requirements in data-driven systems – Code quality principles (simplicity, DRY, readability, modularity) – Naming standards and conventions – Code cleanup and maintainability – Documentation fundamentals – Software Development Life Cycle – Agile and data-centric development – Roles in Data Science teams.

UNIT II Data Structures & Programming Paradigms

Role of data structures in analytical systems – Conceptual overview of data structures (lists, sets, maps, arrays, tabular and matrix-oriented data) – Performance considerations in data handling – Programming paradigms: procedural, object-oriented, and functional – Abstraction, reusability, and maintainability in Data Science software.

UNIT III Error Handling, Logging & Testing

Types of software errors – Error handling and exception management – Logging concepts and best practices – Debugging strategies – Importance

of testing in Data Science workflows – Unit testing, integration testing, and data validation – Conceptual testing of analytical and model-based systems.

UNIT IV Performance, Design & Refactoring

Performance challenges in Data Science software – Performance analysis concepts – Time and space complexity – Big-O notation – Project design and structure – Modular and layered design – Interfaces and contracts – Refactoring strategies – Transition from experimental code to production-ready systems.

UNIT V Collaboration, Deployment & Ethics

Code and project documentation practices – Version control concepts (repositories, commits, branches) – Dependency and environment management – APIs and data services overview – Deployment concepts: automation, CI/CD, containers – Security fundamentals – Ethical and responsible software practices in Data Science.

TEXT BOOKS:

1. Catherine Nelson, Software Engineering for Data Scientists, 1st ed. O'Reilly Media, Inc., Apr. 2024.

REFERENCE BOOKS:

1. A. Treadway, Software Engineering for Data Scientists. Shelter Island, NY, USA: Manning Publications, 2024, ISBN: 978-1-63343-884-2,

WEB LINK:

1. <https://www.simplilearn.com/data-science-course-syllabus-subjects-article>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe software engineering principles and their role in data science applications.
CO-2	Apply appropriate data structures and programming paradigms for efficient data handling.
CO-3	Implement error handling, logging, and testing strategies in data science systems.
CO-4	Analyze performance and design scalable, modular software systems.
CO-5	Evaluate deployment practices, collaboration tools, and ethical considerations in data science projects.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours	Credits			
V	24UCAS53		SOFTWARE ENGINEERING FOR DATA SCIENCE					75	4			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	1	1	2	2	3	1	1	2	2	
CO-2	2	3	2	1	2	2	3	2	2	1	2	
CO-3	2	3	2	2	2	3	2	2	2	2	2	
CO-4	2	3	2	2	3	3	2	3	2	2	3	
CO-5	2	3	3	3	3	3	2	3	2	3	3	
Average	2.2	2.8	2	1.8	2.4	2.6	2.4	2.2	1.8	2	2.4	

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	LARGE LANGUAGE AND VISION MODEL LAB		24UCAS5P1			
Core-P-V			L	T	P	C
Hrs./Week: 4	Hrs./Semester: 60	Marks:100	4	-	2	-

General Objective

To provide hands-on experience in implementing foundational components of large AI models, including language models, vision models, and multimodal systems. The course aims to develop practical skills in text processing, neural architectures, attention mechanisms, and simple deep learning pipelines for real-world AI applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand and implement text preprocessing techniques including tokenization and vocabulary building.
LO-2	Apply encoding techniques such as one-hot encoding and embeddings for text representation.
LO-3	Implement basic language models including n-gram and neural language models.
LO-4	Develop understanding of attention mechanisms and transformer-based architectures.
LO-5	Apply vision and multimodal techniques combining text and image data for simple AI tasks.

1. Program to prepare and clean a text corpus for language modeling.
2. Program to perform word-level and character-level tokenization from scratch.
3. Program to build a vocabulary and map tokens to numerical IDs.
4. Program to implement one-hot encoding and word embeddings using NumPy.
5. Program to implement a simple n-gram language model and generate text.
6. Program to implement a basic neural language model using feedforward neural networks.
7. Program to implement a simple self-attention mechanism using matrix operations.
8. Program to implement a mini Transformer block (embedding + attention + feedforward layer).
9. Program to train a small language model on a tiny dataset and generate text.

10. Program to implement basic image feature extraction using convolution operations.
11. Program to build a simple CNN for image classification using a small dataset.
12. Program to combine text embeddings and image features for a simple multimodal task

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Perform text preprocessing, tokenization, and vocabulary construction for language models.
CO-2	Apply encoding techniques such as one-hot encoding and embeddings for text data.
CO-3	Implement basic language models including n-gram and neural language models.
CO-4	Develop attention mechanisms and simple transformer-based models.
CO-5	Implement vision and multimodal models combining text and image data.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours	Credits			
V	24UCAS5P1		LARGE LANGUAGE AND VISION MODEL LAB					60	2			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	1	2	2	2	2	3	1	2	
CO-2	2	3	2	1	2	2	2	2	3	1	2	
CO-3	2	3	2	1	2	2	2	2	3	1	2	
CO-4	2	3	2	1	2	3	2	3	3	1	2	
CO-5	2	3	3	2	2	3	2	3	3	2	3	
Average	2	3	2.2	1.2	2.0	2.4	2	2.4	3	1.2	2.2	

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	Deep Learning Lab		24UCAS5P2			
Core-P-VI			L	T	P	C
Hrs./Week: 4	Hrs./Semester: 60	Marks:100	-	-	4	2

General Objective

To provide hands-on experience in designing and implementing deep learning models for real-world applications across domains such as computer vision, natural language processing, time-series forecasting, and anomaly detection. The course aims to enhance problem-solving, model development, and analytical skills using modern deep learning techniques.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the process of building deep learning models for real-world applications.
LO-2	Apply deep learning techniques such as CNNs, RNNs, LSTMs, and Autoencoders for various tasks.
LO-3	Perform data preprocessing, model training, and evaluation using appropriate metrics.
LO-4	Analyze and interpret model outputs for decision-making and problem-solving.
LO-5	Develop end-to-end deep learning solutions considering ethical and practical constraints.

1. Handwritten Digit Recognition Using Convolutional Neural Networks
2. Face Mask Detection Using Deep Learning
3. Plant Disease Detection Using Leaf Images
4. Traffic Sign Recognition Using Deep Learning
5. Sentiment Analysis of Student Feedback Using LSTM
6. Spam Message Detection Using Deep Learning
7. Next Word Prediction Using Recurrent Neural Networks
8. Stock Price Trend Prediction Using LSTM
9. Weather Forecasting Using Deep Learning
10. Electricity Consumption Forecasting Using Deep Learning
11. Speech Emotion Recognition Using Deep Learning
12. Music Genre Classification Using CNN
13. Credit Card Fraud Detection Using Autoencoders
14. Image Denoising Using Autoencoders

15. Student Performance Prediction Using Deep Learning
16. Fake News Detection Using Deep Learning

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Identify and formulate real-world problems suitable for deep learning solutions.
CO-2	Apply appropriate deep learning models such as CNNs, RNNs, and LSTMs for specific tasks.
CO-3	Perform data preprocessing, model training, and evaluation effectively.
CO-4	Analyze model performance and interpret results for practical applications.
CO-5	Develop complete deep learning applications and present findings professionally.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
V	24UCAS5P2	MINI PROJECT USING DEEP LEARNING LAB					60	2			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	2	2	2	3	3	1	2
CO-2	2	3	2	1	2	2	2	3	3	1	2
CO-3	2	3	2	1	2	2	2	3	3	1	2
CO-4	2	3	3	2	2	3	2	3	3	2	3
CO-5	2	3	3	2	3	3	2	3	3	2	3
Average	2	3	2.4	1.4	2.2	2.4	2	3	3	1.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	COMPUTER NETWORK		24UEAS51A			
Elective-EC-V			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of data communication principles, network architectures, protocols, and security mechanisms. The course aims to equip students with the knowledge to analyze, design, and manage computer networks and understand their role in modern data-driven and AI-based systems.

Learning Objectives

CO No.	The learners will be able to:
CO-1	Describe the basic concepts of data communication, network models, and performance metrics.
CO-2	Explain transmission media and implement error detection techniques in data communication.
CO-3	Analyze data link control mechanisms and LAN technologies.
CO-4	Apply network and transport layer protocols for data transmission.
CO-5	Evaluate application layer services and network security mechanisms.

UNIT I INTRODUCTION & NETWORK MODELS

Introduction to data communication – Components of data communication – Networks: types and uses – Protocols and standards – Network models – Layered tasks – OSI model: concept and need – Functions of OSI layers – TCP/IP protocol suite and comparison with OSI – Basics of signals – Analog and digital signals – Digital signals – Performance measures: bandwidth, throughput, delay.

UNIT II TRANSMISSION MEDIA & DATA LINK BASICS

Transmission media – Guided media – Twisted pair – Coaxial cable – Optical fiber – Unguided media – Radio waves – Microwaves – Infrared – Using telephone and cable networks – Telephone network – Digital subscriber line (DSL) – Cable TV networks and basic data transfer – Data link layer – Introduction to data link layer – Error detection techniques – Block coding – Checksum – Cyclic redundancy check (CRC).

UNIT III DATA LINK CONTROL & LAN CONCEPTS

Data link control – Framing – Flow control – Error control – Noiseless and noisy channels – Multiple access protocols – Random access – ALOHA – CSMA – Controlled access – Polling – Token passing – Bluetooth: basic architecture – LAN connectivity – Connecting devices – Hubs – Switches – Backbone networks – Virtual LANs (VLANs).

UNIT IV NETWORK & TRANSPORT LAYER

Network layer – Logical addressing – IPv4 addressing – Format and classes – IPv6 addressing – Basic structure – Address mapping – ARP – Error reporting – ICMP – Multicasting – IGMP – Routing concepts – Delivery – Forwarding – Routing – Transport layer – Process-to-process delivery – UDP: features and applications – TCP: features and applications – Congestion control – Quality of service (QoS) .

UNIT V APPLICATION LAYER & NETWORK SECURITY

Application layer – Domain name system (DNS) – Remote logging – Electronic mail – File transfer protocol (FTP) – Security basics – Introduction to cryptography – Symmetric key cryptography – Asymmetric key cryptography – Network security – Security services – Message confidentiality – Digital signatures – Entity authentication – Internet security – IP security– Firewalls: types and functions.

TEXT BOOKS

1. B. A. Forouzan, *Data Communications and Networking with TCP/IP Protocol Suite*, 6th ed., McGraw-Hill Education, 2022.
2. A. Elahi and A. Cushman (Eds.), *Computer Networks: Data Communications, Internet and Network Security*, Springer Cham, 2024.
3. J. West, T. Dean, and J. Andrews, *Data Communications and Computer Networks*, Cengage India, 2024.

REFERENCE BOOKS

1. W. Stallings, *Data and Computer Communications*, 11th ed., Pearson, 2022.
2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, Pearson (2026).

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the basic concepts of data communication, network models, and performance metrics.
CO-2	Explain transmission media and implement error detection techniques in data communication.
CO-3	Analyze data link control mechanisms and LAN technologies.
CO-4	Apply network and transport layer protocols for data transmission.
CO-5	Evaluate application layer services and network security mechanisms.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
V	24UEAS51A	COMPUTER NETWORK						45	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	2	1	1	1	2
CO-2	2	3	2	1	2	2	2	2	2	1	2
CO-3	2	3	2	1	2	2	2	2	2	1	2
CO-4	2	3	2	1	3	3	2	2	2	1	3
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.4	2.4	2.4	2	2	1.8	1.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	ROBOTIC PROCESS AUTOMATION		24UEAS51B			
Elective-EC-V			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of Robotic Process Automation concepts, tools, and implementation strategies. The course aims to equip students with the knowledge to identify automation opportunities, design and develop software bots, and understand the role of RPA in digital transformation and intelligent automation.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of RPA, its evolution, types, benefits, and applications in various industries.
LO-2	Identify and analyze business processes suitable for automation and perform basic planning and feasibility analysis.
LO-3	Explore RPA platforms and understand bot development concepts including workflows and control structures.
LO-4	Understand implementation strategies, project roles, governance, and lifecycle management in RPA projects.
LO-5	Analyze emerging trends such as intelligent automation, AI integration, and the future of RPA.

UNIT I Introduction to RPA

Definition, core concepts, types of RPA (attended, unattended, hybrid), evolution, benefits, limitations, and comparison with traditional automation. Business applications in finance, HR, and customer service; impact on workforce, career opportunities, and skills. Overview of technical concepts including low-code/no-code platforms, OCR, APIs, basic web technologies, flowcharts, and cloud vs on-premise deployment.

UNIT II Process Selection and Planning

Identification of automation-ready processes; characteristics of rule-based and high-volume processes; process documentation and complexity assessment. Introduction to Lean principles, types of waste, and continuous improvement. Basics of RPA planning including ROI calculation, cost-benefit analysis, prioritization, implementation roadmap, and common pitfalls.

UNIT III RPA Platforms and Development Concepts

Overview and comparison of major RPA platforms: UiPath, Automation Anywhere, Blue Prism, and Microsoft Power Automate. Fundamentals of bot development including activities, workflows, variables, control structures, recording features, and selectors. Best practices covering documentation, error handling, testing, and reusability.

UNIT IV Implementation and Management

RPA project roles such as Business Analyst, Developer, Process Owner, and Project Manager. Introduction to Center of Excellence (CoE), governance, and change management. Basics of testing, deployment, monitoring, security, maintenance, and support.

UNIT V Emerging Technologies and Future of RPA

AI-enabled and intelligent automation concepts including OCR, machine learning, IDP, and chatbots. Overview of open-source RPA tools and process mining for automation discovery. RPA market trends, hyperautomation, career paths, certifications, ethical considerations, and future of work.

TEXT BOOKS:

1. Alok Mani Tripathi” Learning Robotic Process Automation: CreateSoftware robots and automate business processes with the leading RPA tool” Packt Publishing Limited March 2018.
2. Tom Taulli “The Robotic Process Automation Handbook” Apress, February 2020.

REFERENCE BOOKS:

1. Steve Kaelble ”Robotic Process Automation” John Wiley & Sons, Ltd., 2018

WEB LINK:

1. <https://www.oreilly.com/library/view/learning-robotic-process/9781788470940/>
2. https://onlinecourses.nptel.ac.in/noc19_me74/preview
3. <https://www.blueprism.com/guides/robotic-process-automation-rpa/>

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the concepts, types, and applications of Robotic Process Automation.
CO-2	Identify automation opportunities and evaluate business processes for RPA implementation.
CO-3	Explain RPA tools and apply basic bot development concepts.
CO-4	Analyze RPA implementation strategies, project roles, and governance models.
CO-5	Evaluate emerging technologies and ethical considerations in intelligent automation.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
V	24UEAS51B	ROBOTIC PROCESS AUTOMATION						45	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	2	1	1	2	2
CO-2	2	3	2	1	2	2	2	3	1	2	2
CO-3	2	3	2	1	2	2	2	3	2	1	2
CO-4	2	3	2	2	2	3	2	3	1	2	2
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.6	2.2	2.4	2	2.6	1.4	2	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	DEVOPS		24UEAS51C			
Elective-EC-V			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of DevOps principles, tools, and practices for modern software development and deployment. The course aims to equip students with the knowledge to integrate development and operations, automate workflows, and build scalable, reliable systems using industry-standard DevOps tools and methodologies.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of DevOps, its culture, lifecycle, and differences from traditional software development models.
LO-2	Apply version control systems, particularly Git, for managing code and collaboration.
LO-3	Understand continuous integration and continuous delivery pipelines and implement basic automation workflows.
LO-4	Explore containerization concepts using Docker and understand container-based application deployment.
LO-5	Understand orchestration, cloud integration, monitoring, and security concepts in DevOps environments.

UNIT I INTRODUCTION TO DEVOPS

DevOps fundamentals – DevOps culture & goals – Traditional SDLC vs DevOps – DevOps principles (CALMS) – DevOps lifecycle – Benefits of DevOps – Overview of DevOps toolchain.

UNIT II VERSION CONTROL SYSTEMS

Version control basics – Centralized vs Distributed VCS – Introduction to Git – Git workflow: clone, commit, branch, merge – Remote repositories – Introduction to GitHub/GitLab – Pull requests and code review basics – Best practices.

UNIT III CONTINUOUS INTEGRATION & DELIVERY

Continuous Integration (CI) – Build automation concepts – Introduction to CI/CD pipelines – Basics of Jenkins and GitHub Actions – Writing simple pipeline files – Automated testing overview – Continuous Delivery & Continuous Deployment – Artifact management.

UNIT IV CONTAINERS

Introduction to virtualization & containers – Docker basics – Docker images & containers – Writing Dockerfile – Docker Compose basics – Container networking overview – Persistence & volumes.

UNIT V INTRODUCTION TO ORCHESTRATION, CLOUD & MONITORING

Container orchestration basics – Introduction to Kubernetes – Pods, Deployments, Services – DevOps in Cloud (AWS/Azure/GCP) – Infrastructure as Code (IaC) overview – Monitoring & Logging basics – DevOps security concepts.

TEXT BOOKS

1. Bass, L., Weber, I., & Zhu, L., *DevOps: A Software Architect's Perspective*, 1st Edition, Addison-Wesley Professional, 2015.
2. Kim, G., Humble, J., Debois, P., & Willis, J., *The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations*, IT Revolution Press, 2016.

REFERENCE BOOKS

1. Humble, J. & Farley, D., *Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation*, 1st Edition, Addison-Wesley Professional, 2010.
2. Turnbull, J., *The Docker Book: Containerization is the New Virtualization*, 1st Edition, James Turnbull, 2014.
3. Bahga, A. & Madiseti, V., *Cloud Computing: A Hands-On Approach*, 1st Edition, Universities Press / BPB Publications, 2016.
4. Loukides, M., *What Is DevOps? How to Make Sense of DevOps in Practice*, O'Reilly Media, 2016.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe DevOps principles, lifecycle, and its role in modern software development.
CO-2	Apply version control practices using Git and manage collaborative workflows.
CO-3	Implement CI/CD pipelines and automation using DevOps tools.
CO-4	Apply containerization techniques using Docker for application deployment.
CO-5	Analyze cloud, orchestration, monitoring, and security practices in DevOps systems.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
V	24UEAS51C	DEVOPS						45	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	2	1	1	2	2
CO-2	2	3	2	1	2	1	2	2	2	1	2
CO-3	2	3	2	1	3	1	2	3	2	1	3
CO-4	2	3	2	1	3	2	2	3	2	1	3
CO-5	2	3	3	2	3	2	2	3	2	2	3
Average	2.2	2.8	2	1.2	2.6	1.4	2	2.4	1.8	1.4	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	OPERATING SYSTEM		24UEAS52A			
Elective-EC-VI			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of operating system principles, including process management, memory management, synchronization, and modern computing architectures. The course aims to equip students with the knowledge to analyze system-level operations and understand how operating systems support advanced computing environments, including AI and high-performance systems.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of operating systems, their structure, services, and types.
LO-2	Analyze process and thread management, including scheduling algorithms and multithreading concepts.
LO-3	Apply synchronization techniques and understand deadlock handling mechanisms.
LO-4	Explore memory management techniques including virtual memory and paging mechanisms.
LO-5	Understand modern processor architectures and the role of operating systems in managing heterogeneous computing systems.

UNIT I Foundations of Operating Systems

Introduction to Operating Systems-Functions and Objectives -Types: Batch, Time-Sharing, Real-Time, Distributed -Operating System Structure-Operating System Services-User Operating System Interface-System Calls and Types of System Calls

UNIT II Process and Thread Management

Process Concept and Process States-Process Control Block (PCB)-Operations on Processes-CPU Scheduling – Basic Concepts-Scheduling Criteria-Scheduling Algorithms: FCFS, SJF, Priority, Round Robin -Threads and Multithreading Models-Thread Scheduling

UNIT III Synchronization and Deadlocks

Concurrent Processes-Critical Section Problem-Synchronization Hardware-Semaphores-Classical Synchronization Problems (Producer-Consumer, Readers-Writers)-Deadlock System Model-Deadlock Characterization-Deadlock Prevention and Avoidance-Deadlock Detection and Recovery

UNIT IV Memory Management and Virtual Memory

Memory Management Concepts-Swapping-Contiguous Memory Allocation-Paging-Page Table Structure-Segmentation-Virtual Memory-

Demand Paging-Page Replacement Concepts and Algorithms –Thrashing – Disk Scheduling

UNIT V Modern Processor Architectures and OS Support

Modern Processor Architectures – Evolution from CPU to Heterogeneous Computing – Graphics Processing Units (GPU): Architecture and OS Support – Neural Processing Units (NPU): Architecture and Role in AI Workloads – Comparison of CPU, GPU, and NPU – Accelerators and Co-processors – Operating System Support for Accelerators – Scheduling and Resource Management in Heterogeneous Systems – Applications in AI, Machine Learning, and High-Performance Computing.

Text Books:

Operating System Concepts (10th Edition, 2018), Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Wiley Publication

Reference books:

1. Modern Operating Systems (5th Edition, October 2022), Andrew S. Tanenbaum, Herbert Bos, Pearson Publication
2. Operating Systems: Internals and Design Principles (9th Edition, 2018), William Stallings, Pearson Publication

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe operating system concepts, structures, and services.
CO-2	Apply CPU scheduling and thread management techniques.
CO-3	Analyze synchronization and deadlock handling strategies.
CO-4	Implement memory management and virtual memory concepts.
CO-5	Evaluate modern processor architectures and OS support for heterogeneous systems.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours		Credits	
V	24UEAS52A		OPERATING SYSTEM					45		3	
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	2	1	1	1	2
CO-2	2	3	2	1	2	1	2	2	2	1	2
CO-3	2	3	2	2	2	1	2	2	2	2	2
CO-4	2	3	2	1	3	2	2	2	2	1	3
CO-5	2	3	3	2	3	2	2	3	2	2	3
Average	2.2	2.8	2	1.4	2.4	1.4	2	2	1.8	1.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline

Head of the Department

Semester-V	QUANTUM COMPUTING		24UEAS52B			
Elective-EC-VI			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a foundational understanding of quantum computing principles, quantum mechanics concepts, and quantum algorithms. The course aims to equip students with the knowledge to understand quantum computational models, analyze quantum circuits, and explore applications of quantum computing in emerging fields such as cryptography, optimization, and machine learning.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the limitations of classical computing and the need for quantum computing along with basic quantum concepts.
LO-2	Analyze quantum mechanics principles relevant to computing such as superposition, entanglement, and quantum states.
LO-3	Apply quantum gates and circuit models to design simple quantum computations.
LO-4	Explore fundamental quantum algorithms and understand their computational advantages.
LO-5	Evaluate quantum hardware, tools, applications, and ethical implications in real-world scenarios.

UNIT I INTRODUCTION TO QUANTUM COMPUTING

Limitations of Classical Computing – Motivation for Quantum Computing – Classical Bits vs Quantum Bits (Qubits) – Basic Quantum Concepts: Superposition and Measurement – Quantum States and Dirac Notation – Bloch Sphere – Overview of Quantum Computing Models – Applications of Quantum Computing – Challenges and Future Scope.

UNIT II QUANTUM MECHANICS FOUNDATIONS FOR COMPUTING

Quantum State Representation – Probability Amplitudes – Measurement Postulate – Quantum Entanglement – Quantum Interference – Tensor Product Concept – Multi-Qubit Systems – No-Cloning Theorem – Quantum Decoherence.

UNIT III QUANTUM GATES AND CIRCUITS

Quantum Gates: Pauli Gates (X, Y, Z), Hadamard Gate, Phase Gate – Multi-Qubit Gates: CNOT, SWAP – Quantum Circuits and Circuit Diagrams – Quantum Circuit Model – Reversible Computing – Introduction to Quantum Programming Paradigms – Simple Quantum Circuit Examples.

UNIT IV QUANTUM ALGORITHMS

Quantum Parallelism – Deutsch-Jozsa Algorithm – Grover's Search Algorithm – Shor's Algorithm – Quantum Fourier Transform – Speedup of Quantum Algorithms over Classical Algorithms – Limitations of Current Quantum Algorithms.

UNIT V QUANTUM HARDWARE, TOOLS, AND APPLICATIONS

Quantum Hardware Technologies: Superconducting Qubits, Trapped Ions, Photonic Qubits – Quantum Error and Noise – Introduction to Quantum Error Correction – Quantum Programming Tools and Simulators – Cloud-based Quantum Computing – Applications in Cryptography, Optimization, Machine Learning, and Chemistry – Ethical and Security Implications – Future Trends in Quantum Computing.

Text Books:

1. Wong, H. Y., *Introduction to Classical and Quantum Computing*, Springer, 2024.
2. Bernhardt, C., *Quantum Computing for Everyone*, MIT Press, 2019.
3. Yanofsky, N. S. & Mannucci, M. A., *Quantum Computing for Computer Scientists*, Cambridge University Press, 2008.

Reference Books:

1. Nielsen, M. A. & Chuang, I. L., *Quantum Computation and Quantum Information*, Cambridge University Press, 2010.
2. Rieffel, E. G. & Polak, W. H., *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
3. Wong, T., *Introduction to Classical and Quantum Computing*, 2022.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe the concepts of quantum computing and distinguish them from classical computing.
CO-2	Analyze quantum states, entanglement, and fundamental quantum principles.
CO-3	Apply quantum gates and design simple quantum circuits.
CO-4	Evaluate quantum algorithms and their computational advantages.
CO-5	Analyze quantum technologies, applications, and ethical considerations.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
V	24UEAS52B	QUANTUM COMPUTING					45	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	2	1	1	1	2
CO-2	2	3	2	1	2	1	2	2	2	1	2
CO-3	2	3	2	1	2	1	2	2	2	1	2
CO-4	2	3	2	1	2	2	2	2	2	1	2
CO-5	2	3	3	3	3	2	2	3	2	3	3
Average	2.2	2.8	2	1.4	2.2	1.4	2	2	1.8	1.4	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-V	MLOPS		24UEAS53C			
Elective-EC-VI			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of MLOps principles, tools, and practices for deploying and managing machine learning models in production environments. The course aims to equip students with the knowledge to build scalable, reliable, and maintainable ML systems by integrating development, deployment, monitoring, and ethical practices.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of MLOps, its lifecycle, and differences from traditional software development and DevOps.
LO-2	Analyze data and model versioning techniques and ensure reproducibility in machine learning workflows.
LO-3	Apply model training, validation, and pipeline concepts for production-ready ML systems.
LO-4	Explore deployment strategies, model serving, and monitoring techniques for ML models.
LO-5	Understand MLOps tools, cloud platforms, and ethical considerations in deploying AI systems.

UNIT I INTRODUCTION TO MLOPS

Introduction to MLOps – Difference between Machine Learning, DevOps, and MLOps – Challenges in deploying ML models – ML lifecycle vs traditional software lifecycle – MLOps principles and goals – End-to-end ML pipeline overview – Use cases of MLOps in industry – Overview of MLOps tools and platforms.

UNIT II DATA & MODEL VERSIONING

Importance of data in ML systems – Data versioning concepts – Dataset management and lineage – Model versioning and experiment tracking – Reproducibility in ML – Introduction to Git for ML projects – Overview of data and model versioning tools (DVC, MLflow) – Best practices for experiment management.

UNIT III MODEL TRAINING, VALIDATION & PIPELINES

Model training workflow – Feature engineering in production ML – Training vs validation vs test in real-world systems – ML pipelines –

Introduction to pipeline orchestration – Automating training workflows – Model evaluation and selection in MLOps – Handling model artifacts.

UNIT IV MODEL DEPLOYMENT & MONITORING

Challenges in deploying ML models – Deployment strategies: batch, online, and real-time inference – Model serving concepts – Introduction to REST APIs for ML models – Model monitoring basics – Data drift and concept drift – Model performance monitoring – Logging and alerting in ML systems.

UNIT V MLOPS TOOLS, CLOUD & RESPONSIBLE AI

Overview of MLOps tools and ecosystems – CI/CD for ML – Containerization for ML models – Cloud platforms for MLOps (AWS/Azure/GCP) – Security in ML systems – Ethical issues in deployed ML systems – Responsible AI practices – Future trends in MLOps and AI deployment.

Text Books:

1. Treveil, M., & Dataiku Team, *Introducing MLOps: How to Scale Machine Learning in the Enterprise*, O'Reilly Media, 2022.
2. Gift, N., & Deza, A., *Practical MLOps: Operationalizing Machine Learning Models*, O'Reilly Media, 2021.
3. Osipov, C., *MLOps Engineering at Scale*, Manning Publications, 2024.

Reference Books:

1. Hapke, H., & Nelson, C., *Building Machine Learning Pipelines*, O'Reilly Media, 2020.
2. Ameisen, E., *Building Machine Learning Powered Applications*, O'Reilly Media, 2021.
3. Burkov, A., *Machine Learning Engineering*, True Positive Inc., 2020.
4. Dubovikov, K., *Managing Data Science: Use Cases and Enterprise Analytics Strategy*, Apress, 2021.
5. Lakshmanan, V., Robinson, S., & Munn, M., *Machine Learning Design Patterns*, O'Reilly Media, 2020.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe MLOps concepts, lifecycle, and its role in ML deployment systems.
CO-2	Apply data and model versioning techniques for reproducible ML systems.
CO-3	Implement ML pipelines for training, validation, and model management.
CO-4	Analyze deployment strategies and monitor ML models in production environments.
CO-5	Evaluate MLOps tools, cloud platforms, and responsible AI practices.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
V	24UEAS53C	MLOPS					45	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	2	1	2	1	2
CO-2	2	3	2	1	2	2	2	2	3	1	2
CO-3	2	3	2	1	3	2	2	3	3	1	3
CO-4	2	3	2	2	3	3	2	3	3	2	3
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.6	2.6	2.4	2	2.4	2.6	1.6	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester - V	Internship	24UIAS51			
Internship		L	T	P	C
	Marks :100				2

The following guidelines have been framed for the courses titled Internship for all the U.G. Programmes.

- Internship is mandatory for all the second year UG Students during the Fourth Semester (Summer vacation). The Internship may be done individually or a group of maximum 6 students. The Internship shall be allotted outside the working hours for a minimum of six days to a maximum of 15 days or 60 hrs. which includes period of Internship, Report writing etc.
- The Internship report is to be printed in the format as presented below
 - Paper : A4
 - Margin : Left:1.25”, Right, Top and Bottom : 1” each
 - Font : Times New Roman and Bamini (for Tamil)
 - Font Size: 12 or 14
 - Spacing : 1.5
 - Printing : Single side
 - Total Pages : 20 to 30
 - Binding : Soft
 - Writing Style : Any style such as MLA/IEEE/Chicago/APA that must be consistently used.

Distribution of Credits, Mode of Examination and Scheme of Evaluation

- 2 Credits will be awarded to the students who complete Internships and produce Internship Completion Certificate duly signed by the authority concerned followed by submission of report and appear in the Viva-voce Examination.
- The Viva-Voce Examination shall be conducted with an External Examiner, the Head and the concerned Supervisor / Guide.
- Marks for the Internship report will be 100 divided as 60% for the Internship report and 40% for Viva-Voce Examination.

The component should be as follows:

Internship Components for Award of Marks	Internal Examiner	External Examiner
Wording of Title / Topic	5	5
Aims and Objectives	5	5
Visit to Industry / Company/Concern	15	15
Chapterisation / Structure of the Report	15	15
Findings/ Summation/Conclusion	10	10
Internship Certificate	10	10
Total	60	60

Viva-Voce Examination

PowerPoint preparation	10	10
Oral Presentation	15	15
The ability to defend the work	5	5
Response to question	10	10
Total	40	40

SEMESTER VI

Semester-VI	NATURAL LANGUAGE PROCESSING		24UCAS61			
Core-VIII			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks:100	5	-	-	5

General Objective

To provide a comprehensive understanding of natural language processing concepts, linguistic foundations, text representation techniques, and modern NLP models. The course aims to equip students with the ability to analyze, process, and build intelligent systems that can understand and generate human language for real-world applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of NLP, linguistic concepts, and challenges in processing natural language.
LO-2	Apply text preprocessing and representation techniques for transforming textual data into computational forms.
LO-3	Analyze syntactic and semantic structures using NLP techniques such as POS tagging and parsing.
LO-4	Explore NLP models and applications including text classification, sentiment analysis, and chatbots.
LO-5	Understand modern NLP approaches including neural models, transformers, and ethical considerations.

UNIT I INTRODUCTION TO NLP AND LINGUISTIC BASICS

Introduction to Natural Language Processing –Why NLP is Difficult – Applications of NLP –Levels of Language Processing –Linguistic Basics:Phonetics and Phonology - Morphology – Morphemes - Syntax – Phrase Structure - Semantics – Meaning Representation - Pragmatics – Context and Discourse. Rule-based vs Statistical NLP –NLP Pipeline – Challenges in NLP.

UNIT II TEXT PROCESSING AND REPRESENTATION

Text Normalization –Tokenization – Sentence Segmentation –Stop Words Removal –Stemming and Lemmatization –Vocabulary and Corpus – Bag-of-Words Model –N-grams –Feature Extraction Techniques –Vector Space Model –Term Frequency (TF) –TF-IDF Representation –Introduction to Word Embeddings.

UNIT III SYNTACTIC AND SEMANTIC PROCESSING

Part-of-Speech (POS) Tagging –Rule-based POS Tagging –Statistical POS Tagging –Introduction to Parsing –Constituency Parsing –Dependency Parsing –Semantic Analysis –Named Entity Recognition (NER) –Word Sense Disambiguation –Coreference Resolution .

UNIT IV NLP MODELS AND APPLICATIONS

Text Classification –Sentiment Analysis –Topic Modeling –Information Extraction –Information Retrieval –Question Answering Systems –Chatbots and Conversational Agents –Machine Learning in NLP –Evaluation Metrics for NLP Models.

UNIT V MODERN NLP, LLMs, AND ETHICS

Introduction to Neural NLP –Word Embeddings (Word2Vec, GloVe) –Sequence Models Overview –Introduction to Transformers –Large Language Models (LLMs) –Prompt-based NLP Systems –Agentic NLP Systems –Ethical Issues in NLP –Bias, Fairness, and Privacy –Future Trends in NLP.

TEXT BOOK

Sohom Ghosh & Dwight Gunning, *Natural Language Processing Fundamentals*, Packt Publishing, 2019.

REFERENCE BOOKS

1. Daniel Jurafsky & James H. Martin, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition*, 3rd Edition (draft), Pearson, 2025.
2. Steven Bird, Ewan Klein & Edward Loper, *Natural Language Processing with Python*, O'Reilly Media, 2009.
3. Yoav Goldberg, *Neural Network Methods in Natural Language Processing*, Morgan & Claypool Publishers, 2017.
4. Jacob Eisenstein, *Introduction to Natural Language Processing*, MIT Press, 2019.
5. Ian Goodfellow, Yoshua Bengio & Aaron Courville, *Deep Learning*, MIT Press, 2016.
6. Dipanjan Sarkar, *Text Analytics with Python: A Practitioner's Guide to Natural Language Processing*, 2nd Edition, Apress, 2019.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe NLP concepts, linguistic basics, and challenges in language processing.
CO-2	Apply text preprocessing and representation techniques such as TF-IDF, BoW, and embeddings.
CO-3	Analyze syntactic and semantic structures using NLP techniques such as parsing and NER.
CO-4	Implement NLP applications such as text classification, sentiment analysis, and information extraction.
CO-5	Evaluate modern NLP models including transformers and assess ethical issues in NLP systems.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UCAS61	NATURAL LANGUAGE PROCESSING					75	5			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	1	2	1	1
CO-2	2	3	2	1	2	1	3	2	3	1	2
CO-3	2	3	2	1	2	2	3	2	3	1	2
CO-4	2	3	2	1	3	2	2	3	3	1	3
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2	1.4	2.4	1.8	2.6	2.2	2.8	1.4	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	INTERNET OF THINGS		24UCAS62			
Core-IX			L	T	P	C
Hrs./Week: 5	Hrs./Semester: 75	Marks:100	5	-	-	5

General Objective

To provide a comprehensive understanding of Internet of Things (IoT) concepts, architectures, hardware components, communication technologies, and cloud integration. The course aims to equip students with the knowledge to design, analyze, and implement IoT-based systems and understand their applications in real-world domains along with security and ethical considerations.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of IoT, its architecture, components, and real-world applications.
LO-2	Analyze IoT hardware components and communication technologies used in connected systems.
LO-3	Explore IoT software platforms, cloud integration, and data handling techniques.
LO-4	Evaluate security challenges, data management, and ethical issues in IoT systems.
LO-5	Design and simulate IoT-based applications using appropriate tools and techniques.

UNIT I INTRODUCTION TO IoT

Introduction to Internet of Things – Evolution of IoT – IoT definition and characteristics – IoT architecture – Three-layer architecture – Five-layer architecture – Components of IoT system – Sensors – Actuators – Devices – Gateways – IoT applications – Smart home – Smart city – Healthcare – Agriculture – Industry 4.0 – Challenges and limitations of IoT.

UNIT II IoT HARDWARE & COMMUNICATION BASICS

Sensors and actuators – Types and working – Microcontrollers and microprocessors – Arduino – Raspberry Pi – Communication technologies – Wi-Fi – Bluetooth – Zigbee – LoRa– IoT communication models – Device-to-device – Device-to-cloud – Device-to-gateway – IoT communication protocols – HTTP – MQTT – CoAP.

UNIT III IoT SOFTWARE & CLOUD PLATFORMS

IoT operating systems – Overview – Middleware for IoT – Cloud computing basics for IoT – IoT cloud platforms – ThingSpeak – AWS IoT –

Google Cloud IoT – Data collection and visualization – Introduction to REST APIs – IoT data analytics – Overview.

UNIT IV IoT SECURITY & DATA MANAGEMENT

IoT security issues and threats – Authentication and authorization in IoT – Data privacy and integrity – Secure communication in IoT – IoT data management – Role of AI and Data Science in IoT – Ethical and social issues in IoT – Case studies.

UNIT V IoT SIMULATION

Introduction to IoT simulation tools – Design of virtual IoT systems – Sensor data simulation – Event-driven IoT applications – IoT use case design

EXT BOOKS

1. R. Chopra, *Internet of Things (IoT)*, 1st ed., S.K. Kataria& Sons, 2022.
2. A. Tripathy, *Internet of Things (IoT): Technologies, Applications, Challenges and Solutions*, Routledge, 2023.

REFERENCE BOOKS

1. R. Misra, M. Rajarajan, B. Veeravalli, N. Kesswani& A. Patel (Eds.), *Internet of Things (IoT): Key Digital Trends Shaping the Future*, Springer Singapore, 2023.
2. V. K. Velliangiri, K. Karthikeyan& S. Srinivasan (Eds.), *Internet of Things: Integration and Security Challenges*, Routledge, 2023.
3. A. Ahmad, Choo&Hakak (Eds.), *Internet of Things Security and Privacy: Practical and Management Perspectives*, Routledge, 2022.
4. M. Alam, K. A. Shakil& S. Khan (Eds.), *Internet of Things (IoT)*, Springer International Publishing, 2020.
5. C. Pfister, *Getting Started with Internet of Things*.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe IoT concepts, architectures, and applications.
CO-2	Analyze IoT hardware and communication protocols.
CO-3	Apply IoT software platforms and cloud technologies for data processing.
CO-4	Evaluate IoT security, data management, and ethical issues.
CO-5	Design and simulate IoT applications for real-world use cases.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UCAS62	INTERNET OF THINGS					75	5			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	2	1	1	1	2
CO-2	2	3	2	1	2	2	2	2	2	1	2
CO-3	2	3	2	1	3	2	2	2	3	1	3
CO-4	2	3	3	3	3	3	2	3	2	3	3
CO-5	2	3	3	2	3	3	2	3	2	2	3
Average	2.2	2.8	2.2	1.6	2.6	2.4	2	2.2	2	1.6	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

SEM-VI	PROJECT		24UCAS63			
CORE-X			L	T	P	C
Hrs./Week:6	Hrs./Semester:90	Marks:100	6		-	3

The following guidelines have been framed for the course titled Project for the UG Programmes

- Project is mandatory for all the Third year UG Students during the Sixth Semester. Individual Projects or a group of maximum 5 students should be taken.
- The Project report is to be printed in the format as presented below
 - Paper : A4
 - Margin : Left:1.25", Right, Top and Bottom : 1" each
 - Font : Times New Roman and Bamini (for Tamil)
 - Font Size: 12 or 14
 - Spacing : 1.5
 - Printing : Single side
 - Total Pages : 45 to 90
 - Binding : Hard
 - Writing Style : Any style such as MLA/IEEE/Chicago/APA that must be consistently used.

Mode of Examinations and Scheme of Evaluation

- The Projects will be evaluated by the Internal Examiner and the External Examiner for 100 marks. The distribution of mark should be 60 marks for the Project Report and 40 marks for the Viva-Voce Examination. The Division of marks for the Project Report is as follows:

Particulars	Internal Examiner	External Examiner
Wording of Title / Topic	5	5
Aims and Objectives / Formulation including Hypothesis	5	5
Introduction / Review of Literature / Relevance of the Project to Social Needs	10	10
Methodology / Techniques / Methods and Materials / Procedure Adopted	10	10
Results and discussion / Findings	15	15
Summary / Conclusion	10	10
Bibliography / Annexure / References/ Foot notes / Works Cited / Works Consulted	5	5
Total	60	60

Viva-Voce Examination

PowerPoint preparation	10	10
Oral Presentation	15	15
The ability to defend the work	5	5
Response to question	10	10
Total	40	40

Semester-VI	NATURAL LANGUAGE PROCESSING LAB		24UCAS6P1			
Core-P-VII			L	T	P	C
Hrs./Week: 4	Hrs./Semester: 60	Marks:100	4	-	2	-

General Objective

To provide hands-on experience in implementing core Natural Language Processing techniques, including text preprocessing, linguistic analysis, feature extraction, and machine learning-based NLP applications. The course aims to develop practical skills for building intelligent language-based systems.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand and implement text preprocessing techniques such as tokenization, stemming, and lemmatization.
LO-2	Apply text representation methods including n-grams, Bag-of-Words, and TF-IDF.
LO-3	Perform syntactic and semantic analysis using POS tagging, parsing, and named entity recognition.
LO-4	Develop machine learning-based NLP models for classification and sentiment analysis.
LO-5	Implement advanced NLP applications such as information retrieval and word embedding-based similarity analysis.

1. Write a program to implement a complete NLP preprocessing pipeline including normalization, tokenization, stopwords removal, stemming, and lemmatization, and compare the outputs at each stage.
2. Write a program to generate unigrams, bigrams, and trigrams from a corpus, compute their frequencies, and predict the next word using bigram probabilities.
3. Write a program to construct Bag-of-Words and TF-IDF representations for a corpus and compare the most important terms using both models.
4. Write a program to perform Part-of-Speech tagging on a paragraph and analyze incorrect or ambiguous tag assignments.
5. Write a program to extract named entities from text, classify them into categories (Person, Location, Organization), and compute their frequency distribution.

6. Write a program to perform dependency parsing on complex sentences and analyze subject–verb–object relationships.
7. Write a program to classify text documents using a machine learning classifier and evaluate the model using accuracy, precision, recall, and F1-score.
8. Write a program to perform sentiment analysis on a dataset and evaluate performance using a confusion matrix and classification report.
9. Write a program to build a simple information retrieval system that ranks documents based on cosine similarity with a query.
10. Write a program to use pre-trained word embeddings to compute similarity between words and perform basic analogy reasoning.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Perform text preprocessing and analyze transformations at each stage.
CO-2	Apply text representation techniques such as n-grams, BoW, and TF-IDF.
CO-3	Implement linguistic analysis techniques including POS tagging and NER.
CO-4	Develop and evaluate NLP models for classification and sentiment analysis.
CO-5	Build advanced NLP applications using embeddings and information retrieval techniques.

Relationship Matrix

Semester	Course Code	Title of the Course						Hours	Credits		
VI	24UCAS6P1	NATURAL LANGUAGE PROCESSING LAB						60	2		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2	3	2	1	2	2	2	2	3	1	2
CO-2	2	3	2	1	2	2	2	2	3	1	2
CO-3	2	3	2	1	2	2	2	2	3	1	2
CO-4	2	3	3	1	2	2	2	3	3	1	3
CO-5	2	3	3	2	2	3	2	3	3	2	3
Average	2	3	2.4	1.2	2	2.2	2	2.4	3	1.2	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	INTERNET OF THINGS LAB		24UCAS6P2			
Core-P-VIII			L	T	P	C
Hrs./Week: 4	Hrs./Semester: 60	Marks:100	4	-	2	-

General Objective

To provide hands-on experience in designing, simulating, and implementing IoT systems using sensors, actuators, communication protocols, and cloud platforms. The course aims to develop practical skills in building real-world IoT applications with an emphasis on data communication, visualization, and security.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand and simulate IoT sensor data and basic hardware interactions.
LO-2	Apply control logic to actuators based on sensor inputs.
LO-3	Develop IoT systems integrating multiple sensors, actuators, and microcontroller platforms.
LO-4	Implement IoT communication using cloud platforms, MQTT, and REST APIs.
LO-5	Design and evaluate real-world IoT applications with security considerations.

1. Program to simulate temperature and humidity sensors and display sensor data.
2. Program to control actuators using threshold-based logic.
3. Program to design and simulate a smart lighting system using sensor inputs.
4. Program to develop a virtual Arduino-based IoT system with multiple sensors and actuators.
5. Program to implement device-to-cloud communication using an IoT cloud platform.
6. Program to publish and subscribe IoT sensor data using MQTT protocol.
7. Program to visualize IoT sensor data using cloud dashboards.
8. Program to exchange IoT data using REST APIs.
9. Program to demonstrate basic IoT security using authentication mechanisms.
10. Program to design and simulate a real-world IoT use case application.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Simulate and analyze sensor data in IoT systems.
CO-2	Implement actuator control using logical decision-making.
CO-3	Develop integrated IoT systems using sensors and microcontrollers.
CO-4	Apply IoT communication protocols and cloud-based data handling.
CO-5	Design and simulate real-world IoT applications with basic security mechanisms.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours	Credits			
VI	24UCAS6P2		INTERNET OF THINGS LAB					60	2			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	1	2	2	2	2	2	1	2	
CO-2	2	3	2	1	2	2	2	2	2	1	2	
CO-3	2	3	2	1	2	2	2	3	2	1	2	
CO-4	2	3	2	1	3	3	2	3	3	1	3	
CO-5	2	3	3	2	2	3	2	3	2	2	3	
Average	2	3	2.2	1.2	2.2	2.4	2	2.6	2.2	1.2	2.4	

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	CLOUD COMPUTING		24UEAS61A			
Core-EC-VII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of cloud computing concepts, architectures, service models, and deployment strategies. The course aims to equip students with the knowledge to utilize cloud platforms for building scalable, secure, and efficient applications, especially in the context of AI and Data Science.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals, evolution, and architecture of cloud computing.
LO-2	Analyze cloud service models and deployment models with real-world use cases.
LO-3	Explore cloud infrastructure components and virtualization technologies.
LO-4	Understand cloud storage, networking, and security mechanisms.
LO-5	Analyze cloud applications and their role in modern computing environments.

UNIT I INTRODUCTION TO CLOUD COMPUTING

Definition and evolution of cloud computing -Limitations of traditional computing -Need for cloud computing -Cloud computing characteristics - Cloud computing architecture: front end and back end -Advantages and challenges of cloud computing.

UNIT II CLOUD SERVICE AND DEPLOYMENT MODELS

Cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) - Comparison of IaaS, PaaS, and SaaS with examples. Cloud deployment models: public cloud, private cloud, hybrid cloud, and community cloud. Use cases of different deployment models -Introduction to popular cloud service providers: AWS, Microsoft Azure, and Google Cloud Platform -Basic pricing and pay-as-you-go concept.

UNIT III CLOUD INFRASTRUCTURE AND VIRTUALIZATION

Introduction to cloud infrastructure - Data centers and their role in cloud computing -Virtualization concepts and types -Hypervisors: Type-1 and Type-2 -Virtual machines and containers - Introduction to storage virtualization -Compute, storage, and networking resources in the cloud.

UNIT IV CLOUD STORAGE, NETWORKING, AND SECURITY

Cloud storage concepts - Types of cloud storage: object storage, block storage, and file storage-Data backup and recovery in the cloud-

Introduction to cloud networking: virtual networks, subnets, and gateways - Basics of cloud security -Shared responsibility model -Identity and access management -Data security and privacy concerns.

UNIT V CLOUD APPLICATIONS AND CASE STUDIES

Introduction to cloud-based applications- Hosting web applications on the cloud -Cloud support for AI and Data Science applications - Cloud platforms for data storage and analytics -Introduction to serverless computing - Real-world use cases of cloud computing in healthcare, education, e-commerce, and smart cities -Future trends in cloud computing.

Textbooks

1. Erl, T., Mahmood, Z., &Puttini, R. (2013). *Cloud computing: Concepts, technology & architecture*. Pearson Education.
2. Erl, T., &Monroy, E. (2023). *Cloud computing: Concepts, technology, security & architecture* (2nd ed.). Pearson Education.
3. Sosinsky, B. A. (2010). *Cloud computing bible*. John Wiley & Sons.

Reference Books

1. Reese, G. (2009). *Cloud application architectures*. O'Reilly Media.
2. Buyya, R., Vecchiola, C., &Selvi, S. T. (2013). *Mastering cloud computing*. McGraw-Hill Education.
3. Rathore, V. S., Atcha, N. M., Tripathi, A., Obaiah, P., &Sahu, S. (2024). *Cloud computing*. Quill Tech Publications.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe cloud computing concepts, architecture, and characteristics.
CO-2	Analyze cloud service and deployment models.
CO-3	Explain cloud infrastructure and virtualization technologies.
CO-4	Evaluate cloud storage, networking, and security mechanisms.
CO-5	Apply cloud computing for real-world applications and emerging technologies.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UEAS61A	CLOUD COMPUTING					45	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	2	1	1	1	2
CO-2	2	3	2	1	2	2	2	2	2	1	2
CO-3	2	3	2	1	3	2	2	2	2	1	3
CO-4	2	3	2	2	3	3	2	3	2	2	3
CO-5	2	3	3	2	3	3	2	3	2	2	3
Average	2.2	2.8	2	1.4	2.6	2.4	2	2.2	1.8	1.4	2.6

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	COMPUTATIONAL BIOLOGY		24UEAS61B			
Core-EC-VII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of biological concepts integrated with computational techniques for analyzing biological data. The course aims to equip students with the knowledge to apply computational methods in genomics, protein analysis, systems biology, and healthcare applications, enabling interdisciplinary problem-solving in life sciences and data science.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand fundamental biological concepts and the role of computation in biological systems.
LO-2	Analyze biological data types, formats, and databases used in bioinformatics.
LO-3	Apply sequence analysis and alignment techniques for DNA and protein data.
LO-4	Explore structural biology and systems biology concepts for understanding complex biological networks.
LO-5	Understand computational methods including machine learning applications in biology and emerging trends.

UNIT I INTRODUCTION TO COMPUTATIONAL BIOLOGY

Introduction to Biology for Computing Students – DNA, RNA, and Proteins – Central Dogma of Molecular Biology – Role of Computation in Biology – Overview of Computational Biology and Bioinformatics – Applications in healthcare, genomics, drug discovery, and personalized medicine – Challenges and ethical considerations in biological data analysis.

UNIT II BIOLOGICAL DATA AND DATABASES

Types of Biological Data: sequence data, structural data, expression data – Biological data formats (FASTA, FASTQ) – Introduction to biological databases: GenBank, UniProt, PDB – Sequence repositories and annotations – Data retrieval concepts – Introduction to biological data preprocessing.

UNIT III SEQUENCE ANALYSIS AND ALIGNMENT

Introduction to sequence analysis – DNA and protein sequences – Pairwise sequence alignment – Global and local alignment (Needleman-Wunsch and Smith-Waterman) – Scoring matrices (PAM, BLOSUM) – Multiple sequence alignment – Applications of sequence alignment.

UNIT IV STRUCTURAL BIOLOGY AND SYSTEMS BIOLOGY

Protein structure levels – Introduction to protein structure prediction – Molecular visualization tools – Basics of systems biology – Biological networks (gene regulatory networks, protein-protein interaction networks) –

Pathway analysis – Introduction to omics data (genomics, proteomics, transcriptomics).

UNIT V COMPUTATIONAL METHODS AND APPLICATIONS

Introduction to machine learning in biology – Sequence-based prediction tasks – Introduction to phylogenetic analysis – Drug discovery and molecular docking – Case studies in computational biology – Ethical, legal, and social issues – Future trends in computational biology.

Textbooks:

1. Pevsner, J., *Bioinformatics and Functional Genomics*, 4th Ed., Wiley-Blackwell, 2022.
2. Lesk, A. M., *Introduction to Bioinformatics*, 5th Ed., Oxford University Press, 2019.
3. Haubold, B. & Wiehe, T., *Introduction to Computational Biology*, Birkhäuser, 2006.

Reference Books:

1. Compeau, P. & Pevzner, P., *Bioinformatics Algorithms: An Active Learning Approach*, Active Learning Publishers, 2015.
2. Singh, G. B., *Fundamentals of Bioinformatics and Computational Biology*, 2nd Ed., Springer, 2025.
3. Clote, P. & Backofen, R., *Computational Molecular Biology: An Introduction*, Wiley, 2000.
4. Tiwary, B. K., *Bioinformatics and Computational Biology: A Primer for Biologists*, Springer, 2022.
5. Claverie, J.-M. & Notredame, C., *Bioinformatics For Dummies*, Wiley, 2014.
6. Cohen, C. & Cohen, W. W., *A Computer Scientist's Guide to Cell Biology*, 2nd Ed., Springer, 2024.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe biological concepts and the role of computation in life sciences.
CO-2	Analyze biological data and utilize bioinformatics databases.
CO-3	Apply sequence alignment and analysis techniques.
CO-4	Evaluate structural and systems biology approaches.
CO-5	Analyze computational methods and applications in biological research.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UEAS61B	COMPUTATIONAL BIOLOGY					45	3			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	2	3	1	2	1	1
CO-2	2	3	2	1	2	2	3	2	3	1	2
CO-3	2	3	2	1	2	2	3	2	3	1	2
CO-4	2	3	2	2	2	3	2	2	2	2	2
CO-5	2	3	3	3	3	3	2	3	3	3	3
Average	2.2	2.8	2	1.6	2.2	2.4	2.6	2	2.6	1.6	2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	BLOCKCHAIN		24UEAS61C			
Core-EC-VII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of blockchain technology, including its architecture, cryptographic foundations, consensus mechanisms, and real-world applications. The course aims to equip students with the knowledge to analyze, design, and develop blockchain-based systems and understand their role in secure, decentralized applications.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of blockchain technology, its evolution, architecture, and types.
LO-2	Analyze cryptographic techniques used in blockchain such as hashing, digital signatures, and Merkle trees.
LO-3	Explore consensus mechanisms and their role in maintaining distributed systems.
LO-4	Understand smart contracts, Ethereum architecture, and basic development concepts.
LO-5	Analyze blockchain platforms, decentralized applications, and real-world use cases along with ethical and regulatory challenges.

UNIT I INTRODUCTION TO BLOCKCHAIN

Evolution of distributed systems – Bitcoin and digital currency – Blockchain definition and features – Blockchain architecture – Types of blockchains – Public blockchain – Private blockchain – Consortium blockchain.

UNIT II CRYPTOGRAPHY FOR BLOCKCHAIN

Cryptographic hash functions – SHA-256 – Digital signatures – Public key cryptography – Merkle trees – Wallets and blockchain addresses.

UNIT III CONSENSUS MECHANISMS

Proof of Work (PoW) – Proof of Stake (PoS) – Delegated Proof of Stake (DPoS) – Practical Byzantine Fault Tolerance (PBFT) – Comparison of consensus algorithms.

UNIT IV SMART CONTRACTS

Introduction to smart contracts – Ethereum architecture – Solidity programming basics – Smart contract deployment – Security issues and vulnerabilities in smart contracts.

UNIT V BLOCKCHAIN PLATFORMS, DAPPS & APPLICATIONS

Blockchain platforms – Ethereum – Hyperledger Fabric – Decentralized applications (DApps) – InterPlanetary File System (IPFS) – Token standards – ERC-20 – ERC-721 – Blockchain scalability issues – Blockchain applications – Finance and cryptocurrency – Supply chain management – Healthcare and identity management – Blockchain in IoT – Legal, ethical, and regulatory challenges.

TEXT BOOKS

1. Imran Bashir, *Mastering Blockchain*, 3rd Edition, Packt Publishing, 2020.
2. Arshdeep Bahga and Vijay Madisetti, *Blockchain Applications: A Hands-On Approach*, Universities Press, 2018.

REFERENCE BOOKS

1. Daniel Drescher, *Blockchain Basics: A Non-Technical Introduction in 25 Steps*, Apress, 2017.
2. Andreas M. Antonopoulos and Gavin Wood, *Mastering Ethereum*, O'Reilly Media, 2018.
3. Arvind Narayanan et al., *Bitcoin and Cryptocurrency Technologies*, Princeton University Press, 2016.
4. Zibin Zheng et al., *Blockchain Technology and Applications*, Springer, 2020.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe blockchain concepts, architecture, and types of blockchain systems.
CO-2	Apply cryptographic techniques used in blockchain systems.
CO-3	Analyze consensus algorithms and their performance.
CO-4	Develop basic smart contracts and understand deployment mechanisms.
CO-5	Evaluate blockchain platforms, applications, and associated challenges.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UEAS61C	BLOCKCHAIN					45	3			
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	2	1	1	1	2
CO-2	2	3	2	1	2	2	2	2	2	1	2
CO-3	2	3	2	1	2	3	2	2	2	1	2
CO-4	2	3	2	1	3	3	2	3	2	1	3
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.4	2.4	2.4	2	2.2	1.8	1.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.K.Ganesh Kumar

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	CYBER SECURITY		24UEAS62A			
Core-EC-VIII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of cryptographic techniques, network security principles, and system protection mechanisms. The course aims to equip students with the knowledge to analyze security threats, design secure communication systems, and apply cryptographic algorithms to protect data in modern computing environments.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the fundamentals of cryptography, security principles, and classical encryption techniques.
LO-2	Analyze modern cryptographic algorithms and web security mechanisms.
LO-3	Understand randomness, malware, and various web-based security threats.
LO-4	Explore network and database security techniques including intrusion detection and encryption methods.
LO-5	Understand operating system security, forensic techniques, and privacy concepts.

UNIT I CRYPTOGRAPHY FUNDAMENTALS

Introduction to cryptography – Key principles of security – Security mechanisms – Security services – Threats and attacks – Information systems security engineering process – Symmetric cipher model – Substitution techniques – Caesar cipher – Monoalphabetic ciphers – Playfair cipher – Hill cipher – Polyalphabetic ciphers – Vigenère cipher – Autokey system – One-time pad – Transposition techniques – Steganography – Stream ciphers and block ciphers – Feistel cipher.

UNIT II WEB AND CRYPTOGRAPHIC SECURITY

Web browser and client security – Web security – Server security – Data Encryption Standard (DES) – Advanced Encryption Standard (AES) – Public key cryptography – RSA algorithm – Hash functions – Cryptographic hash functions – Secure Hash Algorithm (SHA-512) – Digital signatures – ElGamal digital signature – Hashing in digital signatures.

UNIT III RANDOMNESS, WEB THREATS AND MALWARE

Random number generation – Pseudo random number generators – Fermat's theorem – Euler's theorem – Miller-Rabin algorithm – Web threats – Client-level threats – Server-level threats – Service-level threats – Viruses

and malware – Virus characteristics – Virus signatures – Internet worms – Code Red – Trojan horse – Web bugs – Targeted malicious code – Salami attack – Covert channels.

UNIT IV NETWORK AND DATABASE SECURITY

Threats in networks – Categories of attacks – Snort intrusion detection system – Snort architecture – Network security – Groups, rings, and fields – Digital Signature Algorithm (DSA) – Virtual Private Networks (VPN) – Extranet – Elliptic Curve Cryptography (ECC) – Database security – Email security.

UNIT V OPERATING SYSTEM SECURITY AND FORENSICS

Operating system memory protection – Protection mechanisms in general-purpose operating systems – Controlled access – Attacking authentication – Enumerating content and functionality – Packet analysis – Forensic detection – Administering security – Information privacy concepts.

TEXT BOOKS

1. William Stallings, *Cryptography and Network Security: Principles and Practice*, 8th Edition, Pearson Education, 2023.
2. Behrouz A. Forouzan and Debdeep Mukhopadhyay, *Cryptography and Network Security*, 3rd Edition, McGraw-Hill Education, 2021.

REFERENCE BOOKS

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, and Jonathan Margulies, *Security in Computing*, 6th Edition, Pearson Education, 2023.
2. Jason Andress, *Foundations of Information Security*, 3rd Edition, No Starch Press, 2020.
3. Nina Godbole and SunitBelapure, *Cyber Security*, Wiley India, 2019.
4. Chris McNab, *Network Security Assessment*, O'Reilly Media, 2021.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe cryptographic principles and classical encryption techniques.
CO-2	Apply modern cryptographic algorithms and web security concepts.
CO-3	Analyze security threats, malware, and randomness concepts.
CO-4	Evaluate network and database security mechanisms.
CO-5	Analyze operating system security and digital forensic techniques.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
VI	24UEAS62A	CYBER SECURITY					45	3			
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	2	1	1	2	2
CO-2	2	3	2	1	2	2	2	2	2	2	2
CO-3	2	3	2	1	2	3	2	2	2	2	2
CO-4	2	3	2	2	3	3	2	3	2	3	3
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.6	2.4	2.4	2	2.2	1.8	2.4	2.4

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	AGENTIC AI		24UEAS62B			
Core-EC-VIII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a foundational understanding of intelligent agents, their architectures, decision-making processes, and applications in modern AI systems. The course aims to equip students with the knowledge to analyze, design, and evaluate agent-based systems, including multi-agent environments and emerging agentic AI technologies.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand the concept of intelligent agents, their characteristics, and environments.
LO-2	Analyze different types of agents and their architectures.
LO-3	Explore decision-making processes and learning mechanisms in agents.
LO-4	Understand multi-agent systems and their interactions.
LO-5	Evaluate modern agentic AI applications and ethical considerations.

UNIT I INTRODUCTION TO AGENTIC AI

Introduction to Artificial Intelligence –What is an Intelligent Agent? – Examples of Agents in Daily Life –Characteristics of Intelligent Agents – Agent vs Traditional Program – PEAS Framework with Simple Examples – Types of Task Environments (Deterministic, Stochastic, Static, Dynamic).

UNIT II TYPES OF AGENTS AND BASIC ARCHITECTURES

Types of Agents:Simple Reflex Agents - Model-Based Agents - Goal-Based Agents - Utility-Based Agents - Basic Agent Architectures –Sensors and Actuators –Environment Interaction –Introduction to Agent Programs – Agent Life Cycle.

UNIT III BASIC DECISION MAKING IN AGENTS

Agent Decision-Making Process –Rules and Conditions –Goal-Oriented Behavior–Simple Planning Concepts –Introduction to Learning Agents – Basics of Feedback and Adaptation –Examples of Intelligent Decision-Making Systems.

UNIT IV INTRODUCTION TO MULTI-AGENT SYSTEMS

What is a Multi-Agent System? –Single Agent vs Multi-Agent Systems –Cooperation and Competition –Basic Communication Between Agents – Real-Life Examples of Multi-Agent Systems –Swarm Intelligence.

UNIT V MODERN AGENTIC AI APPLICATIONS AND ETHICS

Introduction to AI Assistants and Autonomous Agents –LLM-Based Agents –Tool-Using Agents –Applications of AgenticAI:Smart Assistants – Chatbots - Recommendation Systems - Smart Homes - Ethical Issues in Agentic AI –AI Safety and Responsible AI –Future Scope of Agentic AI.

TEXT BOOKS

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson Education, 2021.

REFERENCE BOOKS

1. Michael Wooldridge, *An Introduction to Multi-Agent Systems*, 2nd Edition, Wiley, 2009.
2. SohomGhosh and Dwight Gunning, *Natural Language Processing Fundamentals*, Packt Publishing, 2019.
3. Peter Norvig, *Artificial Intelligence: Foundations of Computational Agents*, Pearson Education, 2020.
4. Luciano Floridi, *Ethics of Artificial Intelligence*, Oxford University Press, 2019.
5. ShlomoZilberstein (Ed.), *AI and Multi-Agent Systems*, Springer, 2021.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe intelligent agents, their characteristics, and environments.
CO-2	Analyze different types of agents and their architectures.
CO-3	Apply basic decision-making and learning concepts in agents.
CO-4	Analyze multi-agent systems and their interactions.
CO-5	Evaluate modern agentic AI applications and ethical issues.

Relationship Matrix

Semester	Course Code		Title of the Course					Hours	Credits		
VI	24UEAS62B		AGENTIC AI					45	3		
Course Outcomes (COs)	Programme Outcomes(POs)						Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	1	1	2	1	3	1	2	1	1
CO-2	2	3	2	1	2	2	3	2	2	1	2
CO-3	2	3	2	1	2	2	2	2	2	1	2
CO-4	2	3	2	1	2	3	2	3	2	1	2
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2	1.4	2.2	2.2	2.4	2.2	2	1.4	2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.M.Nagoor Meeral

Checked by: Dr.V.Roseline
Head of the Department

Semester-VI	ETHICS FOR ARTIFICIAL INTELLIGENCE		24UEAS62C			
Core-EC-VIII			L	T	P	C
Hrs./Week: 3	Hrs./Semester: 45	Marks:100	3	-	-	3

General Objective

To provide a comprehensive understanding of ethical principles, societal implications, and governance frameworks related to Artificial Intelligence. The course aims to equip students with the ability to design, evaluate, and deploy AI systems responsibly, ensuring fairness, transparency, accountability, and respect for human values.

Learning Objectives

LO No.	The learners will be able to:
LO-1	Understand ethical theories and their relevance to Artificial Intelligence systems.
LO-2	Analyze bias, fairness, and discrimination in AI systems and explore mitigation strategies.
LO-3	Evaluate privacy, data protection, and ethical data usage in AI applications.
LO-4	Understand transparency, explainability, and accountability in AI systems.
LO-5	Analyze social, legal, and economic impacts of AI and explore responsible AI practices.

UNIT I Introduction to Ethics and AI

Ethics: definition, scope, and importance-Moral philosophy: deontology, utilitarianism, virtue ethics-Evolution of Artificial Intelligence-Why ethics matters in AI-Ethical dilemmas in intelligent systems

UNIT II Bias, Fairness, and Discrimination

Algorithmic bias and sources of bias-Data bias and representation issues-Fairness metrics and trade-offs-Case studies: hiring systems, facial recognition-Mitigation strategies for bias

UNIT III Privacy, Surveillance, and Data Ethics

Data privacy principles-Consent and data ownership-AI-driven surveillance systems-Data protection laws (GDPR overview, India's DPDP Act basics)-Ethical data collection and usage.

UNIT IV Transparency, Explainability, and Accountability

Black-box vs interpretable models-Explainable AI (XAI) concepts-Accountability and responsibility in AI decisions-Auditing and monitoring AI systems-Trustworthy AI principles

UNIT V Social, Legal, and Economic Impacts of AI

Impact of AI on employment and workforce-AI and inequality-AI in healthcare, criminal justice, and governance-Legal liability and regulation of AI-AI and human rights.Responsible and Ethical AI Practices:Ethical AI design frameworks-Human-centered AI-AI governance and policy-Global AI ethics guidelines (OECD, UNESCO, EU AI Act overview)-Future directions and challenges

Textbooks

1. M. Coeckelbergh, *AI Ethics*, MIT Press, 2020.
2. L. Floridi, *Ethics of Artificial Intelligence*, Oxford University Press, 2019.

Reference Books

1. C. O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, Crown Publishing Group, 2016.
2. V. Dignum, *Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way*, Springer, 2019.

Course Outcomes

CO No.	Upon completion of the course, students will be able to:
CO-1	Describe ethical principles and their application in AI systems.
CO-2	Analyze bias and fairness issues in AI and propose mitigation strategies.
CO-3	Evaluate data privacy, surveillance, and ethical data practices.
CO-4	Analyze explainability, accountability, and transparency in AI systems.
CO-5	Evaluate societal, legal, and ethical implications of AI and apply responsible AI practices.

Relationship Matrix

Semester	Course Code	Title of the Course					Hours		Credits		
VI	24UEAS62C	ETHICS FOR ARTIFICIAL INTELLIGENCE					45		3		
Course Outcomes (COs)	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	3	2	2	3	2	1	2	1	1	3	2
CO-2	2	3	2	3	2	2	2	2	2	3	2
CO-3	2	3	2	3	2	2	2	2	2	3	2
CO-4	2	3	3	3	2	2	2	2	2	3	2
CO-5	2	3	3	3	3	3	2	3	2	3	3
Average	2.2	2.8	2.4	3	2.2	2.0	2	2	1.8	3	2.2

STRONG(3),MEDIUM(2)and LOW(1)

Prepared by :Dr.V.Roseline

Checked by: Dr.V.Roseline

Head of the Department

**SCHEME OF EXAMINATIONS (2024-2027) FOR UG PROGRAMMES
(UNDER CHOICE BASED CREDIT SYSTEM)
Applicable for those who joined in the academic year 2024-2025**

- The medium of instruction in all the UG Programmes is English and Students shall write the Examinations in English.
- The evaluation system integrates both Continuous Internal Assessment (CIA) and End Semester Examination (ESE).
- The CIA consists of the following components

CIA Components in UG Programmes for Part I & II, Core & Elective Courses

CIA I	CIA II	Total	Average $\frac{\text{Total}}{4}$	Assignment	Attendance	CIA Mark (Col 4+5+6)
1	2	3	4	5	6	7
30	30	60	15	5	5	25

CIA Components in UG Programmes for Part IV Courses

CIA I	CIA II	Total	Average $\frac{\text{Total}}{4}$	Attendance	CIA Mark (Col 4+5)
1	2	3	4	5	6
20	20	40	10	5	15

Part IV Courses consists of Skill Enhancement Courses (SEC), Non-Major Elective Courses (NME), Foundation Courses, Value Education I & II, Environmental Studies Course

CIA Components in UG Programmes for & Practical Courses

Course Type	CIA I	CIA II	Total	Average $\frac{\text{Total}}{2}$	Record	Attendance	CIA Mark
1	2	3	4	5	6	7	8
Core, Elective	30	30	60	30	5	5	40 (Col 5+6+7)
Allied	30	30	60	30	5	5	20 (Col 5 + 6 + 7)
							2

- Two assignments are mandatory for all the Courses except Part IV Courses.
- If a student cannot write a CIA Examination, Special Examinations will be conducted on the payment of prescribed fee.

Distribution of Marks for the CIA Tests and Semester Examinations in UG, Certificate, Diploma and Advanced Diploma Programmes

Course Type	TOTAL MARKS	CIA TESTS MAX.MARKS	SEMESTER EXAMINATION Max. Marks	PASSING MINIMUM		
				CIA	SEM. EXAM	OVERALL
Part I & II, Core & Elective	100	25	75	Nil	30	40
Part IV Courses	50	15	35	Nil	14	20
Practical (2/3Hrs.)	50	20	30*	Nil	12	20
Practical (3/4/6 Hrs.)	100	40	60	Nil	24	40
Project / Internship	100	Nil	Report - 60 Marks Viva-voce - 40 Marks	Nil	40	40

* In case of 2 hours Practical Courses End Semester Examination will be conducted for a total mark of 60 marks and it will be converted into 30 marks. i.e. $\frac{\text{Total Mark}}{2}$

Duration of Examination for UG Programmes

Course Type	CIA I	CIA II	Model	Semester
Core & Core Elective Courses	1½ hrs	1½ hrs	2 hrs	3 hrs
Inter Disciplinary & SEC Courses	1 hr	1 hr	2 hrs	2 hrs
Portion for various examinations	1½ Units	1½ Units	4 Units	All Units

Practical Question Pattern for Part I & II, Core & Elective Courses in UG Programme Examinations (Theory)

Part	Part-A	Part-B	Part-C	Total Marks
Question pattern	Multiple Choice Questions (MCQ) Answer All	Answer should not exceed 250 words Answer All - Internal Choice (Either or type)	Answer should not exceed 500 words Answer All - Internal Choice (Either or type)	
CIA I & II	6 Questions Q Nos. 1 - 6	2 Questions Q No. 7(a) or 7(b) Q No. 8(a) or 8(b)	2 Questions Q No. 9(a) or 9(b) Q No. 10(a) or 10(b)	30 Marks
	6 x 1 = 6	2 x 4 = 8	2 x 8 = 16	
Model	10 Questions Q Nos. 1 - 10	4 Questions Q No. 11(a) or 11(b) Q No. 12(a) or 12(b) Q No. 13(a) or 13(b) Q No. 14(a) or 14(b)	3 Questions Q No. 15(a) or 15(b) Q No. 16(a) or 16(b) Q No. 17(a) or 17(b)	50 Marks
	10 x 1 = 10	4 x 4 = 16	3 x 8 = 24	
Semester	15 Questions Q Nos. 1 - 15	5 Questions Q No. 16(a) or 16(b) Q No. 17(a) or 17(b) Q No. 18(a) or 18(b) Q No. 19(a) or 19(b) Q No. 20(a) or 20(b)	5 Questions Q No. 21(a) or 21(b) Q No. 22(a) or 22(b) Q No. 23(a) or 23(b) Q No. 24(a) or 24(b) Q No. 25(a) or 25(b)	75 Marks
	15 x 1 = 15	5 x 4 = 20	5 x 8 = 40	

Question Pattern for Part IV Courses in UG Programme Examinations (Theory)

Part	Part-A	Part-B	Part-C	Total Marks
Question pattern	Short Answer Questions in Two or Three Sentences Answer All	Answer should not exceed 250 words Answer All - Internal Choice (Either or type)	Answer should not exceed 500 words Open choice One out of two Questions	
CIA I & II	2 Questions Q Nos. 1 - 2	2 Questions Q No. 3(a) or 3(b) Q No. 4(a) or 4(b)	2 Questions Q No. 5 Q No. 6	20 Marks
	2 x 2 = 4	2 x 4 = 8	1 x 8 = 8	
Model	4 Questions Q Nos. 1 - 4	4 Questions Q No. 5(a) or 5(b) Q No. 6(a) or 6(b) Q No. 7(a) or 7(b) Q No. 8(a) or 8(b)	2 Questions Q No. 9 Q No. 10 Q No. 11	40 Marks
	4 x 2 = 8	4 x 4 = 16	2 x 8 = 16	
Semester	5 Questions Q Nos. 1 - 5	4 Questions Q No. 6(a) or 6(b) Q No. 7(a) or 7(b) Q No. 8(a) or 8(b) Q No. 9(a) or 9(b) Q No. 10(a) or 10(b)	2 Questions Q No. 11 Q No. 12 Q No. 13 Q No. 14 Q No. 15	50 Marks
	5 x 2 = 10	5 x 4 = 20	2 x 10 = 20	

The question pattern for Practical Courses is determined by the respective Department.

End Semester Examination (ESE)

The students who have the required number of days of attendance are eligible to appear for the End Semester Examinations irrespective of whether they have passed the CIA Tests or not. They should pay the examination fees for all the current courses and the arrear courses, if any, and submit the application form before the due date announced. Students with arrears can apply for a Maximum of 4 courses in a semester except in the Sixth Semester where the students with arrears can apply for any number of arrear Courses. During Odd Semesters, Odd Semester Courses alone can be written, but during Even Semesters, all Semester Courses can be written.

Examination Pattern for Value-Added Courses

Duration of Examination	2 hours
Question Pattern:	
Section A (5 x 2 = 10 marks)	Two Questions (Two marks each) will be asked from each Unit. Students must answer 5 out of the 6 questions.
Section B (5 x 4 = 20 marks)	Two Questions (4 marks each) will be asked from each Unit. Students must answer 5 out of 6 questions
Section C (2 x 10 = 20 marks)	One Question (10 marks each) will be asked from each Unit. Students must answer any 2 out of 3 questions
Passing minimum	20 marks

Examination Pattern for Value Added Course in Mathematics for Competitive Examinations

Duration of Examination	2 hours
Question Pattern	All Multiple-Choice Questions (MCQ)
No. of questions	50 x 1 = 50 Marks
Passing minimum	20 marks

MOOC / NPTEL Examination Pattern:

Marks secured in MOOC / NPTEL Examinations will be converted for 100 marks. If a student cannot pass in MOOC / NPTEL Examinations, special examinations will be conducted in our College on the payment of prescribed fee.

Examination Pattern for Part - V Courses

Marks for the Part – V Courses are based on the number of activities performed by the students. Maximum Mark will be 100 and Passing minimum for UG Programmes is 40 Marks.

**SCHEME OF EXAMINATIONS (2024-2027) FOR UG PROGRAMMES
(UNDER CHOICE BASED CREDIT SYSTEM)**

For those who joined in the Academic Year 2025-2026 onwards

- The medium of instruction in all the UG Programmes is English and Students shall write the Examinations in English.
- The evaluation system integrates both Continuous Internal Assessment (CIA) and End Semester Examination (ESE).
- The CIA consists of the following components

CIA Components in UG Programmes for Part I & II, Core & Elective Courses

CIA I	CIA II	Model	Total	Average $\frac{\text{Total}}{22} \times 3$	Assignment	Attendance	CIA Mark (Col 5+6+7)
1	2	3	4	5	6	7	8
30	30	50	110	15	5	5	25

CIA Components in UG Programmes for Part IV Courses

CIA I	CIA II	Model	Total	Average $\frac{\text{Total}}{8}$	Attendance	CIA Mark (Col 5+6)
1	2	3	4	5	6	7
20	20	40	80	10	5	15

Part IV Courses consist of Skill Enhancement Courses (SEC), Non-Major Elective Courses (NME), Foundation Courses, Value Education I & II, Environmental Studies Course

CIA Components in UG Programmes for & Practical Courses

Course Type	CIA I	CIA II	Total	Average $\frac{\text{Total}}{2}$	Record	Attendance	CIA Mark
1	2	3	4	5	6	7	8
Core & Elective	30	30	60	30	5	5	40 (Col 5+6+7)
Allied	30	30	60	30	5	5	$\frac{20}{2} \times ((\text{Col } 5 + 6 + 7))$

- Two assignments are mandatory for all the Courses except Part IV Courses.
- If a student cannot write a CIA or Model Examination, Special Examinations will be conducted on the payment of prescribed fee.

Distribution of Marks for the CIA Tests and Semester Examinations in UG, Certificate, Diploma and Advanced Diploma Programmes

Course Type	TOTAL MARKS	CIA TESTS MAX.MARKS	SEMESTER EXAMINATION Max. Marks	PASSING MINIMUM		
				CIA	SEM. EXAM	OVERALL
Part I & II, Core & Elective	100	25	75	Nil	30	40
Part IV Courses	50	15	35	Nil	14	20
Practical (2/3 Hrs.)	50	20	30*	Nil	12	20
Practical (3/4/6 Hrs.)	100	40	60	Nil	24	40
Project / Internship	100	Nil	Report - 60 Marks Viva-voce - 40 Marks	Nil	40	40

* In case of 2 hours Practical Courses End Semester Examination will be conducted for a total mark of 60 marks and it will be converted into 30 marks. i.e. $\frac{\text{Total Mark}}{2}$

Duration of Examination for UG Programmes

Course Type	CIA I	CIA II	Model	Semester
Core & Core Elective Courses	1½ hrs	1½ hrs	2 hrs	3 hrs
Inter Disciplinary & SEC Courses	1 hr	1 hr	2 hrs	2 hrs
Portion for various examinations	1½ Units	1½ Units	4 Units	All Units

Practical Question Pattern for Part I & II, Core & Elective Courses in UG Programme Examinations (Theory)

Part	Part-A	Part-B	Part-C	Total Marks
Question pattern	Multiple Choice Questions (MCQ) Answer All	Answer should not exceed 250 words Answer All - Internal Choice (Either or type)	Answer should not exceed 500 words Answer All - Internal Choice (Either or type)	
CIA I & II	6 Questions Q Nos. 1 - 6	2 Questions Q No. 7(a) or 7(b) Q No. 8(a) or 8(b)	2 Questions Q No. 9(a) or 9(b) Q No. 10(a) or 10(b)	30 Marks
	6 x 1 = 6	2 x 4 = 8	2 x 8 = 16	
Model	10 Questions Q Nos. 1 - 10	4 Questions Q No. 11(a) or 11(b) Q No. 12(a) or 12(b) Q No. 13(a) or 13(b) Q No. 14(a) or 14(b)	3 Questions Q No. 15(a) or 15(b) Q No. 16(a) or 16(b) Q No. 17(a) or 17(b)	50 Marks
	10 x 1 = 10	4 x 4 = 16	3 x 8 = 24	
Semester	15 Questions Q Nos. 1 - 15	5 Questions Q No. 16(a) or 16(b) Q No. 17(a) or 17(b) Q No. 18(a) or 18(b) Q No. 19(a) or 19(b) Q No. 20(a) or 20(b)	5 Questions Q No. 21(a) or 21(b) Q No. 22(a) or 22(b) Q No. 23(a) or 23(b) Q No. 24(a) or 24(b) Q No. 25(a) or 25(b)	75 Marks
	15 x 1 = 15	5 x 4 = 20	5 x 8 = 40	

Question Pattern for Part IV Courses in UG Programme Examinations (Theory)

Part	Part-A	Part-B	Part-C	Total Marks
Question pattern	Short Answer Questions in Two or Three Sentences Answer All	Answer should not exceed 250 words Answer All - Internal Choice (Either or type)	Answer should not exceed 500 words Open choice One out of two Questions	
CIA I & II	2 Questions Q Nos. 1 - 2	2 Questions Q No. 3(a) or 3(b) Q No. 4(a) or 4(b)	2 Questions Q No. 5 Q No. 6	20 Marks
	2 x 2 = 4	2 x 4 = 8	1 x 8 = 8	
Model	4 Questions Q Nos. 1 - 4	4 Questions Q No. 5(a) or 5(b) Q No. 6(a) or 6(b) Q No. 7(a) or 7(b) Q No. 8(a) or 8(b)	2 Questions Q No. 9 Q No. 10 Q No. 11	40 Marks
	4 x 2 = 8	4 x 4 = 16	2 x 8 = 16	
Semester	5 Questions Q Nos. 1 - 5	5 Questions Q No. 6(a) or 6(b) Q No. 7(a) or 7(b) Q No. 8(a) or 8(b) Q No. 9(a) or 9(b) Q No. 10(a) or 10(b)	2 Questions Q No. 11 Q No. 12 Q No. 13 Q No. 14 Q No. 15	50 Marks
	5 x 2 = 10	5 x 4 = 20	2 x 10 = 20	

The question pattern for Practical Courses is determined by the respective Department.

End Semester Examination (ESE)

The students who have the required number of days of attendance are eligible to appear for the End Semester Examinations irrespective of whether they have passed the CIA Tests or not. They should pay the examination fees for all the current courses and the arrear courses, if any, and submit the application form before the due date announced. Students with arrears can apply for a Maximum of 4 courses in a semester except in the Sixth Semester where the students with arrears can apply for any number of arrear Courses. During Odd Semesters, Odd Semester Courses alone can be written, but during Even Semesters, all Semester Courses can be written.

Examination Pattern for Value Added Courses

Duration of Examination	2 hours
Question Pattern:	
Section A (5 x 2 = 10 marks)	Two Questions (Two marks each) will be asked from each Unit. Students must answer 5 out of the 6 questions.
Section B (5 x 4 = 20 marks)	Two Questions (4 marks each) will be asked from each Unit. Students must answer 5 out of 6 questions
Section C (2 x 10 = 20 marks)	One Question (10 marks each) will be asked from each Unit. Students must answer any 2 out of 3 questions
Passing minimum	20 marks

Examination Pattern for Value Added Course in Mathematics for Competitive Examinations

Duration of Examination	2 hours
Question Pattern	All Multiple-Choice Questions (MCQ)
No. of questions	50 x 1 = 50 Marks
Passing minimum	20 marks

MOOC / NPTEL Examination Pattern:

Marks secured in MOOC / NPTEL Examinations will be converted for 50 marks. If a student cannot pass in MOOC / NPTEL Examinations, special examinations will be conducted in our College on the payment of prescribed fee.

Examination Pattern for Part - V Courses

Marks for the Part – V Courses are based on the number of activities performed by the students. Maximum Mark will be 100 and Passing minimum for UG Programmes is 40 Marks and for PG Programmes 50 Marks.