

DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

**Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited with 'B' Grade by NAAC
Pollachi-642001**



SYLLABUS

**B.Sc. COMPUTER SCIENCE WITH ARTIFICIAL
INTELLIGENCE & MACHINE LEARNING**

BATCH 2026-2029

Department of Computer Science with Artificial Intelligence & Machine Learning

Institute Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Institute Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

Department Vision

To be a leading school of emerging trends in Artificial Intelligence and Machine Learning that affords quality education to equip students with the technical know-how, ascertain their hidden talents, provide ambient environment to show case their highest potential and to transform the students to be creative and innovative leaders and entrepreneurs as anticipated by the Industry

Department Mission

- To offer a broad and balanced academic plans that strengthens and emphasizes high quality and creative instruction
 - To strive for quality education that will prepare young minds for imbibing knowledge, skills and sensitivity.
 - To create a platform for students for exploring their creative potential and nurturing the spirit of entrepreneurship and critical thinking to adapt better to the changing global scenario and gain access to multiple career opportunities.
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- To motivate the budding professionals in exploiting the potential of start-ups and innovations in Artificial Intelligence & Machine Learning and the related Domains and to maintain level of excellence and standards that offers them statewide, national and international significance.

Program Educational Objectives:

The Program Educational Objectives (PEOs) describe the expected professional accomplishments and societal contributions of Artificial Intelligence & Machine Learning graduates about three to four years after completing the undergraduate program. The PEOs are as follows:

PEO1	Professional Competence Graduates will apply strong foundations in Computer Science, Artificial Intelligence, and Machine Learning to design, develop, and deploy innovative software solutions for real-world problems across diverse domains.
PEO2	Career Advancement and Higher Studies Graduates will pursue successful careers in IT industries, AI-driven organizations, startups, research institutions, or higher education in advanced areas of Computer Science, Artificial Intelligence, Data Science, and related fields.
PEO3	Ethical and Social Responsibility Graduates will demonstrate ethical practices, professional integrity, teamwork, leadership skills, and social responsibility while developing AI and ML-based solutions that positively impact society.
PEO4	Lifelong Learning, Innovation & Entrepreneurship Graduates will engage in continuous learning, research, innovation, Entrepreneurial skills and adaptation to emerging technologies in AI, Machine Learning, and Computing to remain competitive in a rapidly evolving technological landscape.

Program Outcomes (POs)

Program Outcomes (POs) are the graduate attributes acquired by students at the time of completing their undergraduate program. These outcomes are aligned with the Graduate Attributes (GAs) prescribed by the UGC under the LOCF framework and are common to all disciplines of study.

The attainment of POs is assessed at the time of graduation for every outgoing batch. The POs are addressed and achieved through the Course Outcomes (COs) of the various courses in the curriculum, and collectively contribute to the attainment of the Program Educational Objectives (PEOs).

PO1	Computational Knowledge: Apply knowledge of mathematics, statistics, and computer science fundamentals to solve computing and AI-related problems.
PO2	Programming Proficiency: Demonstrate proficiency in programming languages and paradigms to develop efficient software and AI solutions.
PO3	Problem Analysis: Identify, analyze, and formulate complex computational problems using logical and analytical thinking.
PO4	Algorithmic Thinking: Design and analyze algorithms and data structures for optimized and scalable solutions.
PO5	AI & ML Model Development: Develop, train, evaluate, and optimize machine learning and artificial intelligence models for real-world applications.
PO6	Data Handling & Analytics: Collect, preprocess, analyze, and interpret structured and unstructured data using modern analytical tools.
PO7	Modern Tool Usage: Utilize contemporary tools, frameworks, cloud platforms, and development environments relevant to AI and ML.
PO8	Research & Innovation: Conduct experiments, interpret results, and contribute to innovative AI-driven research and development.
PO9	Ethics & Social Responsibility: Understand and apply ethical principles, data privacy laws, and responsible AI practices in professional work.
PO10	Communication Skills: Communicate effectively through technical reports, documentation, and presentations to diverse audiences.
PO11	Teamwork & Leadership: Function effectively as an individual, team member, or leader in multidisciplinary environments.
PO12	Project Management: Apply project planning, management principles, and financial considerations in software and AI product development.
PO13	Entrepreneurship: Demonstrate entrepreneurial skills to create technology-driven startups and innovative solutions.
PO14	Sustainability & Societal Impact: Analyze the societal, environmental, and economic impacts of computing and AI technologies and promote sustainable practices.
PO15	Lifelong Learning: Engage in continuous professional development to adapt to emerging technologies such as deep learning, generative AI, and data science.

Program Specific Outcomes:

The **Program Specific Outcomes (PSOs)** are defined by the stakeholders of the program and describe the discipline-specific skills that a Artificial Intelligence & Machine Learning graduate is expected to acquire at the time of graduation. Unlike the general Program Outcomes (POs) prescribed by UGC-LOCF, PSOs are exclusive to the discipline (Artificial Intelligence & Machine Learning) and are achieved through the teaching–learning process of the courses in the curriculum.

For the **B.Sc program**, the Department, in consultation with stakeholders, has identified the following PSOs:

PSO - 01	Professional Proficiency: Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently on par with the expected quality standards for Artificial Intelligence and Machine Learning professional.
PSO - 02	Societal and Environmental Sustainability: Apply the technical and critical thinking skills in the discipline of artificial intelligence and machine learning to find solutions for complex problems. Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.

Course Outcomes (COs) specify the measurable learning achievements that students are expected to attain upon successful completion of course.

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO
CO1																	
CO2																	
CO3																	
CO4																	
CO5																	

3 Point Scale – 1, 2, 3

1. A **Credit** is a unit by which the coursework is measured. It determines the number of hours of instruction required per week over the duration of a semester (Minimum 15 weeks).
 - a) 1 Credit of class room theory = 15 hours of engagement in a semester.
 - b) 1 Credit of Practical/Internship/workshop-based activity/theory under ODL = 30 hours of engagement in a semester.
 - c) 1 Credit of field visit/industry visit/Assignments = 40-45 hours of engagement in a semester
 - d) Research Project/Dissertation: Either entire semester/Equivalent to one paper
2. **Choice Based Credit System (CBCS)** provides an opportunity for the students to choose courses from the prescribed courses basket comparing Major/Core, Minor/Elective of Skills Based (Vocational) courses.
3. **Learning Hours:** Total outcome-based learning hours for credits shall include:
 - Classroom Teaching/Tutorials
 - Lab work/Practical/Projects/Assignments/Seminars
 - Sports/Games/Physical Activities/ Yoga
 - Social/Community work (Including NCC/NSS participation)
 - Internship/Apprenticeship/On the Job Training (OJT), field visit, Projects

2. Distribution of Credit and selection of courses across Three (UG) / Two Years (PG) Degree Programmes:

2.1. Major Discipline Course

Major discipline is the main focus (Core) subjects and the degree will be awarded in that discipline.

Students must secure a prescribed minimum number of credits (About 50% of total credits) in the major discipline. Major courses shall be available to choose in every semester. The weightage of the credits of a course may differ (4-6 credits) based on level of the courses. The number of courses in Major may vary from semester to semester.

2.2. Minor Discipline Course

Minor discipline is the broader understanding of the course beyond the major discipline course.

2.3. Interdisciplinary/ Multidisciplinary/Allied Course

This is constituent discipline of the major courses and helps learners to acquire core competence in relevant or any other independent courses. This course may be major specific or other discipline specific. Minimum of 9 credits may be allocated to Interdisciplinary/ Multidisciplinary/Allied courses.

S.No	Category	Abbreviation	Description
1	Core Course	CC	Mandatory courses that provide fundamental and advanced knowledge in the primary discipline, ensuring academic depth and programme uniformity.
2	Allied Course	AC	Supportive courses related to the core discipline that enhance conceptual understanding and interdisciplinary knowledge.
3	Allied Optional	AO	Elective allied courses that allow students to choose additional subjects related to or supportive of the major discipline.
4	Foundation Course	FC	Courses designed to bridge the gap between school education and higher education by strengthening basic academic skills and knowledge.
5	Ability Enhancement Compulsory Course	AECC	Mandatory courses aimed at enhancing essential skills such as communication and environmental awareness for all students.
6	AE-1: Communicative English	AE-1	A compulsory course offered in Semester II to develop communication and language skills, conducted beyond regular class hours.
7	AE-2: Environmental Science	AE-2	A compulsory course offered in Semester I focusing on environmental awareness, sustainability, and responsible citizenship.
8	Value Education	VE	Courses that promote moral, ethical, and social values to ensure holistic personality development and responsible citizenship.
9	Skill Enhancement Course	SEC	Application-oriented courses designed to develop practical, technical, and employability skills related to the programme.
10	Non-Major Elective/Extra Departmental Course	NME/EDC	Interdisciplinary courses offered by other departments to provide basic knowledge outside the student's major, promoting multidisciplinary learning.
11	Discipline Specific Elective	DSE	Advanced and specialized elective courses within the discipline offered in Semesters V and VI, allowing students to choose areas of interest.
12	Discipline Specific Skill Enhancement Course	DSSEC	
13	Self Study	SS	A course designed for independent learning, completed outside regular class hours to promote learner autonomy.
14	Internship	IS	Practical training undertaken after Semester IV during summer, followed by report submission and viva-voce in Semester V.
15	Outreach Programme	OR	A compulsory activity to promote social responsibility and community engagement through service-oriented initiatives.
16	Extra Credit Courses	EC	Additional credits earned through approved online courses such as MOOCs offered via platforms like SWAYAM and NPTEL or through institutional certificate courses.

2.4. Summer Internship / Field visits / Projects/ Apprenticeship / Community Engagement and Service corresponding to Major Subject, Co-Curricular Courses and Research Project.

- Internship/ Apprenticeship corresponding to Major subjects are suggested in fifth or sixth semester.
- Field visits/ Projects / Community Engagement and services corresponding to Major subject to be offered in third years.

2.5. Research Project/Dissertation:

The research project / dissertation will be in major discipline with social relevance leading to product development / problem solving / prototypes.

**DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE &
MACHINE LEARNING**

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2026 - 2029)

I to VI SEMESTERS

SCHEME OF EXAMINATIONS

SEMESTER – I										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	26UTL1C1	Tamil Paper-I	5	-	-	3	25	75	100	3
	26UHN1C1	Hindi Paper-I								
	26UFR1C1	French Paper-I								
II	26UEN101	Communication Skills – I	5	-	-	3	25	75	100	3
III	26UAI101	CC I: Problem solving and Programming in C	4	-	-	3	25	75	100	4
	26UAI102	CC II: Data Structures and Applications	4	-	-	3	25	75	100	4
	26UAI1A1/ 26UAI1A2	GE I – Allied I: Introduction to Linear Algebra / Discrete Mathematics	4	-	-	3	25	75	100	4
	26UAI103	CC Lab I: Data Structures Using C Lab	-	5	-	3	20	30	50	2
IV	26EVS101	AECC I: Environmental Studies	2	-	-	-	-	50	50	2
	26HEC101	VE: Human Excellence: Personal Values & Indian Yoga Practice – I	1	-	-	2	20	30	50	1
V		Extension Activities – Annexure II	-	-	-	-	-	-	-	-
EC		Online Course(Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			30						650	23

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

SEMESTER – II										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	26UTL2C2	Tamil Paper-II	5	-	-	3	25	75	100	3
	26UHN2C2	Hindi Paper-II								
	26UFR2C2	French Paper-II								
II	26UEN202	Communication Skills – II	5	-	-	3	25	75	100	3
III	26UAI204	CC III: Java Programming	4	-	-	3	25	75	100	4
	26UAI205	CC IV: Operating Systems	4	-	-	3	25	75	100	4
	26UAI2A1/ 26UAI2A2	GE II – Allied II: Probability & Statistics / Optimization Techniques	5	-	-	3	25	75	100	4
	265UAI206	CC Lab II: Java Programming Lab	-	4	-	3	20	30	50	2
	26UAI2S1 /26UAI2S2	SEC I: Naan Mudhalvan: Front end UI/UX Development/ Industry 5.0	2	-	-	2	-	50	50	2
IV	26HEC202	VE: Human Excellence : Family Values & Indian Yoga Practice - II	1	-	-	2	20	30	50	1
EC	26CMM201	IKS: Manaiyiyal Mahathuvam-I			-	-	-	-	-	Grade
	26CUB201	IKS: Uzhavu Bharatham– I			-	-	-	-	-	Grade
	26UAI2VA	VAC-I: Practical approach for Statistical problems using AI and Machine Learning			-					2*
		Online Course(Optional)(MOOC/NPTEL/SWAYAM)								
Total			30						650	23

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course;

SEC – Skill Enhancement Course; IKS – Indian Knowledge System;

SEMESTER – III										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	26UTL3C3	Tamil Paper-III	4	-	-	3	25	75	100	3
	26UHN3C3	Hindi Paper-III								
	26UFR3C3	French Paper-III								
II	26UEN3C3	Communication Skills – III	4	-	-	3	25	75	100	3
III	26UAI307	CC V: Python Programming	4	-	-	3	25	75	100	4
	26UAI308	CC VI: Artificial Intelligence	4	-	-	3	25	75	100	4
	26UAI3A1/ 26UAI3A2	GE III – Allied III: Discrete Structures and its Applications / Numerical techniques	4	-	-	3	25	75	100	4
	26UAI309	CC Lab III: Python Programming Lab	-	4	-	3	20	30	50	2
	26UAI310	CC Lab IV: AI Lab	-	4	-	3	20	30	50	2
IV	26UAI3N1 / 26UAI3N2	Extra Departmental Course (EDC I): Web Development Essentials / Advanced Excel Lab	-	1	-	2	-	50	50	1
	26HEC303	VE : Human Excellence - Professional Values & Ethics - Indian Yoga Practice – III	1	-	-	2	20	30	50	1
	26GKL301	General Awareness – Self Study	ss	-	-	2		50	50	1
V	26UHW301	Health and Wellness	2 [#]	-	-	-	-	-	-	1
		Extention Activities Annexure II			-	-	-	-	-	-
EC	26CMM302	IKS: Manaiyiyal Mahathuvam-II			-	-	-	-	-	Grade
	26CUB302	IKS: Uzhavu Bharatham-II			-	-	-	-	-	Grade
		Online Course(Optional)(MOOC/NP TEL/SWAYAM)								
Total			30						750	26

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; VAC-Department Specific Value Added Course;

*Extra Credits; IKS – Indian Knowledge System;

SEMESTER – IV										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	26UTL4C4	Tamil Paper-IV	4	-	-	3	25	75	100	3
	26UHN4C4	Hindi Paper-IV								
	26UFR4C4	French Paper-IV								
II	26UEN4C4	Communication Skills – IV	4	-	-	3	25	75	100	3
III	26UAI411	CC VII: Machine Learning Techniques	4	-	-	3	25	75	100	3
	26UAI412	CC VIII: Data Base System Concepts	4	-	-	3	25	75	100	3
	26UAI4A1/ 26UAI4A2	GE IV – Allied IV: Computer Networks / Software Engineering	4	-	-	3	25	75	100	3
	26UAI413	CC Lab V: ML Lab	-	4	-	3	20	30	50	2
	26UAI414	CC Lab VI : DBMS Lab	-	4	-	3	20	30	50	2
	26UAI415	Mini Project					20	30	50	1
	26UAI4S1/ 26UAI4S2	SEC II: Naan Mudhalvan :Advanced Java script Front end Framework with Angular / Aptitude using Vedic Mathematics	-	2	-	2	-	50	50	2
IV	26UAI4N1 / 26UAI4N2	Extra Departmental Course(EDC II): Web Application Development/ Transforming Data with Excel and Power BI	-	1	-	2	-	50	50	2
	26HEC404	VE: Human Excellence – Social Values & Indian Yoga Practice IV	1	-	-	2	20	30	50	1
V		Extension Activities – Annexure II	-	-	-	-	-	-	-	1
EC	26CMM403	IKS: ManaiyiyalMahathuvam-III			-	-	-	-	-	Grade
	26CUB403	IKS: UzhavuBharatham– III			-	-	-	-	-	Grade
	26UAI4VA	VAC-II: A Pratical Approach for Predictive Analytics in Skill Development			-	-	-	-	-	Grade
		Online Course(Optional)(MOOC/NPTEL/S WAYAM)								
Total			30						800	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; SEC – Skill Enhancement Course; VAC-Department Specific Value Added Course; IKS – Indian Knowledge System;*Extra Credits;

SEMESTER V										
Part	Course Code	Course Title	Hrs/Week		Hrs /Sem	Exam Hrs	MAX.MARKS			Credits
			L	P			T	Int	Ext	
III	26UAI516	CC IX: Natural Language Processing	5	-	-	3	25	75	100	4
	26UAI517	CC X: Big data technologies	5	-	-	3	25	75	100	4
	26UAI5E1/ 26UAI5E2/ 26UAI5E3	DSE-I: IoT/ Soft Computing/ Mobile Application Development	5	-	-	3	25	75	100	5
	26UAI518	CC Lab VI: Programming Lab in NLP	-	5	-	3	20	30	50	2
	26UAI519	CC Lab VII: Big Data Technologies Lab	-	5	-	3	20	30	50	2
IV	26UAI5S1/ 26UAI5S2 / 26UAI5S3	SEC-III: AI for Cyber Security /Advanced Java script back end Framework(Node JS,Express JS)/ Human Computer Interaction	4	-	-	3	-	50	50	2
	26HEC505	VE:Human Excellence Paper: National Values& Indian Yoga Practice- V	1	-	-	2	20	30	50	1
	26UAI5AL	ALC I: Business Intelligence	SS		-	-	-	100	100	2**
EC	26AID501	Soft Skills Development – I	-	-	-	-	-	-	-	Grade
		Online Course(Optional)(MOOC/NPTEL/SWA YAM)								
Total			30						600	20
Discipline Specific Elective (DSE) – I [#] 26UAI5E1: IoT 26UAI5E2: Soft Computing 26UAI5E3: Mobile Application Development										

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course CC – Core Course;

DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course ALC-Advanced Learner Course (Optional)

* Extra Credits; **Credits – Based on course content maximum of 4 credits

	SEMESTER VI									
Part	Course code	Course Title	Hrs/ Week		Hrs/ Sem	Exam Hrs	MAX.MARKS			Credits
			T	P			Int	Ext	Total	
III	26UAI620	CCXI :Deep Learning	5	-	-	3	25	75	100	3
	26UAI6E4 26UAI6E5 26UAI6E6	DSE–II:UI/UX Design/ Gen AI/ Text Analytics	4	-	-	3	25	75	100	5
	26UAI6E7 26UAI6E8 26UAI6E9	DSE–III :AR/VR/ Open Source Software/ Robotics& its Applications	5	-	-	3	12	38	50	5
	26UAI621	CC Lab IX: Deep Learning Lab	-	6	-	3	20	30	50	2
	26UAI622	CC Lab X :UI/UX Lab/ Data Visualization Lab / Text Analytics	-	5	-	3	20	30	50	2
	26UAI623	Project	-	-	-	-	25	75	100	2
IV	26UAI6S4/ 26UAI6S5/ 26UAI6S6	SEC IV: Social & Ethical Issues in AI/ Computer Vision/Recommender Systems	4	-	-	2	12	38	50	2
	26HEC606	VE:Human Excellence Paper: Global Values & IndianYoga Practice-VI	1	-	-	2	20	30	50	1
EC	26AID602	Soft Skills Development–II	-		-	-	-	-	-	Grade
	26UAI6AL	ALC-II :Quantum Computing	SS		-	-	-	100	100	2*
Total			30						650	22
	GrandTotal								4100	140
Discipline Specific Elective (DSE) – II ^{##} 26UAI6E4: UI/UX Design 26UAI6E5: Gen AI 26UAI6E6: Text analytics				Discipline Specific Elective (DSE) – III ^{###} 26UAI6E7: AR/VR 26UAI6E8: Open Source Software 26UAI6E9: Robotics& its Applications						
Completion of at least one approved Massive Open Online Course (MOOC) through the SWAYAM platform or NPTEL is mandatory for all students as part of the programme requirements.										
Students shall successfully complete the course and obtain certification within the stipulated period. The credits earned through these online courses shall be considered as per the institutional norms and regulations.										
This initiative aims to promote self-paced learning, interdisciplinary exposure, industry-relevant knowledge, and lifelong learning competencies among students.										

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course CC – Core Course;

DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course ALC-Advanced Learner Course (Optional)

*Extra Credits;**Credits – Based on course content maximum of 4 credits

List of Abbreviations:

CC – Core Course

GE – Generic Elective

AECC –Ability Enhancement Compulsory Course

SEC – Skill Enhancement Course

DSE – Discipline-Specific Elective

VAC –Value Added Course

ALC – Advanced Learner Course

Grand Total = 3900; Total Credits = 140

Passed by Board of Studies Meeting held on 07.03.2026

Approved by 5th Academic Council Meeting held on 25.03.2026

Question Paper Pattern (Based on Bloom's Taxonomy)

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q1 – 5 MCQ) (Q6 – 10 Define / Short Answer / MCQ)	$10 * 1 = 10$	MCQ / Define	75
K3 (Q11-15)	B (Either or pattern)	$5 * 5 = 25$	Short Answers	
K4 & K5 (Q16 – 20)	C (Either or pattern)	$5 * 8 = 40$	Descriptive/ Detailed	

2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q 1 – 10 MCQ)	$10 * 1 = 10$	MCQ	50 (Reduced to 38)
K3 (Q11 – 15)	B (Either or pattern)	$5 * 3 = 15$	Short Answers	
K4 & K5 (Q16-20)	C (Either or pattern)	$5 * 5 = 25$	Descriptive/ Detailed	

3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	$10 * 1 = 10$	MCQ / Define	50 (Reduced to 38)
K3, K4 & K5 (Q11-15)	B (Either or pattern)	$5 * 8 = 40$	Descriptive/ Detailed	

4. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	50	20	30	10	05	05
Practical (Core / Elective)	75	30	45	20	05	05
Practical (Core / Elective)	100	40	60	30	05	05

5. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25
Project	150	40	75	35
Project	200	50	100	50

* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	$(75+75+15+10)/7$	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)

Components		Calculation	CIA Total
Test 1	50	$(50+50+10+10)/10$	12
Test 2 / Model	50		
Assignment / Digital Assignment	10		
Seminar	10		

PROJECT**Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;**

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;

Components		Calculation	CIA Total
Review I	10	10+ 10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

** Components for 'Review' may include the following:*

Originality of idea, relevance to current trend, candidate involvement, and presentation of report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

Continuous Internal Assessment for Project

For Computer Science Cluster

Maximum Marks: 100 Marks

Components for CIA: 25 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	05	25
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	05	
III	Coding, Input forms, Output format, Testing OR Development, Testing	05	
IV	Preparation of Report & Submission	10	

Components for CEE: 75 Marks

Components for CEE	Marks	Total	Grand Total
Evaluation			75
Title Relevance of the Industry/Institute	10	50	
Technology	10		
Design and Development Publishing	10		
Testing, Report	20		
Viva Voce			
Project Presentation	10	25	
Q&A Performance	15		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of the fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of the computer science lab as well as in the organization. The periodical review will be conducted to monitor the progress of the project work. The project report will be prepared and submitted at the end of the semester. An external examiner appointed by the Controller of Examination will conduct the viva voce examination along with a respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc.
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters

- 8. Appendix
- 9. References

Format of Table of Contents

TABLE OF CONTENTS

Chapter No.	Title	Page No.
i	Certificates	
ii	Declaration	
iii	Acknowledgement	
iv	Synopsis	
	1. Introduction	
	1.1 Introduction	
	1.2 Objective of the Project	
	1.3 Company Profile	
	1.4 System Specification	
	1.4.1 Hardware Specification	
	1.4.2 Software Specification	
	2 System Study	
	2.1 Existing System	
	2.1.2 Drawbacks	
	2.2 Proposed System	
	2.3 Planning and Scheduling	
	3 System Design	
	3.1 Overview of the Project	
	3.2 Modules of the Project	
	3.3 Input Design Format	
	3.4 Output Design	
	3.5 Table Design	
	3.6 Supporting Diagrams (ER/DFD/Use Case)	
	4 Implementation and Testing	
	4.1 Coding Methods	
	4.2 Testing Approach	
	4.3 Implementation and Maintenance	

5 Project Evaluation

- 5.1 Project Outcome
- 5.2 Limitations of the Project
- 5.3 Further Scope of the Project

6 Conclusion

7 Appendix

- 7.1 Source Code
- 7.2 Screenshots and Reports

8 References

Size of the Project

The Project Report contents should be a maximum of not exceeding 70 pages.

HEALTH AND WELLNESS COURSE**Scheme of Evaluation**

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
	Total	100

SEMESTER I

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI101			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	75	Core I: Problem solving and Programming in C	Semester:	I
					Credits:	4

Course Objective

- To introduce basic problem-solving and algorithmic thinking using pseudocode, flowcharts, and structured programming.
- To develop proficiency in C programming fundamentals, including data types, control structures, arrays, functions, pointers, structures, and file handling.
- To promote awareness of systematic data organization and record-keeping, integrating Indian Knowledge Systems (IKS) and Indian contributions to computing.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand problem-solving techniques and develop algorithms using iteration and recursion.	PO1,PO3,PO4,PSO1
CO2	Apply C programming fundamentals including data types, operators, expressions, and I/O operations	PO1,PO2,PSO1
CO3	Implement decision-making constructs, loops, arrays, and string handling techniques.	PO1-PO3,PSO1
CO4	Design modular programs using user-defined functions, structures, and unions.	PO2,PO4,PSO1
CO5	Apply pointers and file handling techniques to manage data effectively and develop efficient programs.	PO1-PO4,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	3	3	-	1	1	-	-	1	1	-	-	-	2	3	2
CO2	3	3	2	2	-	1	2	-	-	1	1	-	-	-	2	3	2
CO3	3	3	3	2	-	2	2	1	-	1	1	-	-	-	2	3	2
CO4	2	3	2	3	-	2	2	1	-	2	2	1	-	-	2	3	2
CO5	3	3	3	3	1	2	2	1	1	2	2	2	1	1	2	3	3

Units	Content	Hrs
I	INTRODUCTION TO PROBLEM SOLVING TECHNIQUES : Fundamentals - Computer Hardware – Computer Software - Algorithms - Building blocks of algorithms (statements, state, control flow, functions) - Notation (pseudo code, flow chart, and programming language) -Problem formulation - Algorithmic problem solving - Simple strategies for developing algorithms (iteration, recursion). Illustrative problems. Introduction to C Programming:	15
II	Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators - Arithmetic Expressions - Evaluation of expression - precedence of arithmetic operators - Type conversion in expression – operator precedence & Associatively - Mathematical functions - Reading & Writing a character - Formatted input and output.	15
III	Decision Making and Branching: Introduction – if, if....else, nesting of if ...else statements- else if ladder – The switch statement, The?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops. Arrays and Strings : Arrays-One Dimensional Array-Two Dimensional Arrays-Initializing Two Dimensional Arrays-Multi Dimensional Arrays-Handling of Character Strings-Declaring and Initializing String Variables- Reading Strings from terminal-Writing Strings to Screen-Arithmetic Operations on Characters-Putting Strings Together-Comparison of Two strings-String Handling Functions	15
IV	User-Defined Functions: Introduction – Need and Elements of User-Defined Functions- Definition- Return Values and their types - Function Calls – Declarations – Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - The Scope, Visibility and Lifetime of Variables- Multi file Programs. Structures and Unions: Structures-Definition-Giving Values to members Structure Initialization- Comparison of Structure Variables-Arrays of Structures-Arrays with Structures - Structures and Functions-Unions-Size of Structures	15
V	Pointers and Files: Pointers - Declarations - Advantages of pointers - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Pointer arithmetic. File Management in C-Defining and Opening a File-Closing a File-I/O Operation on Files-Error Handling during I/O Operations-Random Access Files-File Inclusion-Compiler Control Directives. Data organization and record-keeping in ancient India. Case studies: Indian contributions to software development and computing.	15
	Total Contact Hrs	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E. Balagurusamy	Programming in ANSI C	9th Edition , McGraw Hill Education (India)	2024
2	Yashavant Kanetkar	Let Us C	21 st Edition, BPB Publications, New Delhi	2025
3	Brian Kernighan & Dennis Ritchie	The C Programming Language	2 nd Edition, Pearson Education (Reprint), Noida	2023

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ReemaThareja	Programming in C	(3rd Edn), Oxford University Press	2023
2	Herbert Schildt	C: The Complete Reference	4 th Edition, Tata McGraw Hill, New Delhi	2024
3	B. Forouzan& R. Gilberg	Computer Science: A Structured Programming Approach in C	4 th Edition, Cengage Learning (India)	2024

Web References

<https://www.geeksforgeeks.org/generations-of-computers-computer-fundamentals/>
<https://opentextbc.ca/computerstudies/chapter/classification-of-generations-of-computers/>
<https://www.tutorialspoint.com/cprogramming/index.htm>
<https://www.javatpoint.com/c-programming-language-tutorial>

CourseDesignedby	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI102			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core II:	Semester:	I	
				Data Structures and Applications	Credits:	4	

Course Objective

- Provide a strong foundation in fundamental data structures and their operations.
- Develop problem-solving and algorithmic thinking skills for efficient computation.
- Enable students to implement and analyze data structures using suitable programming languages.
- Introduce applications of data structures in Artificial Intelligence and Machine Learning.
- Integrate IKS such as traditional logical reasoning, algorithmic thinking, and structured knowledge representation with modern data structures.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand linear and non-linear data structures.	PO1,PO2
CO2	Analyze algorithm efficiency using time and space complexity.	PO1,PO3,PO4,PSO1
CO3	Implement trees and graph algorithms.	PO1-PO4, PSO1
CO4	Apply sorting and searching techniques.	PO1-PO4, PSO1
CO5	Design optimized solutions using appropriate data structures.	PO1-PO4, PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	—	—	1	—	—	—	—	—	—	—	2	2	1
CO2	3	2	3	3	—	2	1	1	—	—	—	—	—	—	2	3	2
CO3	3	3	3	3	2	1	2	1	—	1	1	—	—	—	2	3	2
CO4	3	3	3	3	1	2	1	—	—	—	—	—	—	—	2	3	2
CO5	3	3	3	3	2	2	2	1	—	1	1	2	1	—	3	3	3

Units	Content	Hrs
Unit I	Introduction : Algorithms, Array, Stack and Queue h Introduction to algorithms - Definition - Properties - Development of Algorithms - Data Structures - Definition - Classification- Analysis of Algorithms - Asymptotic Notations. Arrays: Representation of Arrays - Operations - Applications - Stack - Stack operations - Applications - Queue - Queue Operations - Applications.	12
Unit II	Linked List : Introduction - Logical representation of linked list - Linked list operations - Types of linked lists -Singly linked list - Doubly linked lists - Circular linked lists - Linked stacks and queues - polynomial addition - Dynamic Storage Management - Garbage collection and compaction.	13
Unit III	Non Linear Data Structures: Trees - Definition and Basic Terminologies -Representation of Trees - Binary Trees: Basic Terminologies and Types - Representation of Binary Trees - Binary Tree Traversals - Threaded Binary Trees - Application. Graphs: Introduction - Definitions and Basic Terminologies - Representations of Graphs - Graph Traversals - Applications.	12
Unit IV	Sorting: Introduction- Bubble Sort - insertion sort-Selection Sort – Merge Sort – shell Sort – Quick Sort - Heap Sort –Radix Sort.	11
Unit V	Searching: Introduction -Linear Search - Transpose sequential search - Interpolation search-Binary Search - Fibonacci search-other search techniques. Case Study: Smart Medicinal Plant Identification System -A smart medicinal plant identification system uses Artificial Intelligence (AI) to identify plants used in the Indian Knowledge System (IKS) such as Ayurveda. The user captures an image of a plant using a mobile application. The AI model analyzes the image and identifies the plant. Data structures like arrays, trees, and graphs help store and organize plant data efficiently. The system then provides information about the plant's medicinal uses and benefits.	12
	Total Hours	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	G AVijayalakshmiPai	Data structures and Algorithms	McGraw Hill, 1 st Edition, ISBN: 9780070667266	2008
2	Horowitz, S. Sahni, and S. Rajasekaran	Computer Algorithms	Galgotia Pub. Pvt. Ltd.,	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T. H. Cormen, C. E. Leiserson, R. L. Rivest	Introduction to Algorithms	Prentice hall, 3 rd Edition	2009

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B. Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI1A1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	60	GE I - Allied I : Introduction to Linear Algebra	Semester:	I
					Credits:	4

Course Objective

- To introduce the concepts of Numbers, Quantification, sets, logical reasoning, probability and calculus

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Define basic terms and concepts of matrices.	PO1,PO2
CO2	Comprehend the use of various matrix operations	PO1,PO2,PSO1
CO3	Understand the concept of Vector spaces and Basis	PO1,PO2,PO4,PSO1
CO4	Determine Eigen values and Eigen Vectors	PO1-PO4,PSO1
CO5	Determine orthogonal set concept	PO1,PO2, PO4

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	1	1	2	—	—	—	—	—	—	2	—	—	—	2	1
CO2	3	3	2	2	2	—	—	—	—	—	—	2	—	—	—	3	1
CO3	3	3	2	3	2	—	—	—	—	—	—	2	1	—	—	3	2
CO4	3	3	3	3	2	—	—	—	—	—	—	2	1	—	—	3	2
CO5	3	3	2	3	2	—	—	—	—	—	—	2	1	—	—	2	2

Units	Content	Hrs
Unit I	Linear Equations: Introduction – system of homogeneous linear equations – augmented matrix – row echelon form - finding the solution of homogeneous system ($AX=0$) - System of non-homogeneous linear equations - working rule for finding the solutions for $AX=B$ - Simple problems.	12
Unit II	Matrices and their algebra: Introduction – matrix – types of matrices – matrix addition and multiplication – partitioning matrices – simple problems. Operation on matrices: Transpose of a matrix – symmetric and skew symmetric – conjugate – conjugate transpose – Hermitian and skew-Hermitian – orthogonal – unitary matrices – simple problems.	11
Unit III	System of simultaneous linear equations: Introduction – determinants – determinant of a square matrix – singular and non-singular matrices – minors and cofactors – adjoint of a matrix – invertible matrices – inverse of a matrix – Cramer's rule – theorems (statements only) –rank of a matrix – simple problems.	13
Unit IV	The characteristic equation of a matrix: Introduction – polynomial of a square matrix - characteristic equation of a matrix - characteristic vector of a matrix – Cayley's Hamilton theorem – some results on characteristic roots and vectors – simple problems.	11
Unit V	Vector spaces: Introduction – vector spaces – subspaces – subspace spanned by a set of vectors – basis and dimension of a vector space – standard basis – some results in basis and dimension of a vector space – linear transformation – non-singular linear transformation – inner product – orthogonal – orthonormal - simple problems.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R.S Aggarval and Matharu	Linear Algebra,	S. Chand and Company Ltd	1999

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gilbert Strang	Introduction to Linear Algebra,	Wellesley – Cambridge Press, 5th Edition.	2016
2	Gilbert Strang	Linear Algebra and Its Applications.	Cengage Learning Fourth Edition.	2006
3	David C. Lay, Steven R. Lay, and Judi J. McDonald	Linear Algebra and Its Applications.	Pearson – 5th Edition.	2014

Course Designed by	Dr. A. Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI1A2			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	GE I - Allied I: Discrete Mathematics	Semester:	I
					Credits:	4

Course Objectives

- This course has been designed for students to learn and understand the logic and Proof basic concept of counting and graph
- Apply the concept of counting Techniques

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	PO1,PSO1
CO2	Demonstrate an understanding of relations ,functions, Combinations and lattices	PO1,PO2, PSO1
CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	PO1,PO2, PO4, PSO1
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	PO1,PO2, PO4, PSO1
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	PO1,PO2, PO4, PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	1	2	2	—	—	—	—	—	—	2	—	—	—	3	1
CO2	3	3	2	2	2	—	—	—	—	—	—	2	—	—	—	3	1
CO3	3	3	2	3	2	—	—	—	1	1	—	2	1	—	—	3	2
CO4	3	3	2	3	2	—	—	—	1	1	—	2	1	—	—	3	2
CO5	3	3	2	3	2	—	—	—	1	1	—	2	1	—	—	3	2

Units	Content	Hrs
Unit I	Relations: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	12
Unit II	Coding Theory: Introduction – Hamming distance – Encoding a Message – Group codes – Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	12
Unit III	Mathematical Logic: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	12
Unit IV	Graph Theory :Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal's algorithm to find an optimal tree of a weighted graph.	12
Unit V	Number Theory: Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid's theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	12
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. M. K. Venkataraman, Dr. N. Sridharan, N. Chandrasekaran	Discrete Mathematics	The National Publishing Company Chennai	2006
2	S. Kumaravelu & Susheela Kumaravelu	Graph Theory	JankiCalender Corporation, Sivakasi,	1999
3	Kumaravelu and SuseelaKumaravelu	Elements of Number Theory	Raja Sankar offset Printers.	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	Discrete Mathematical Structures with Applications to Computer Science	McGraw Hill International Edition	2007
2	Dr. A. Singaravelu, Dr.V.Ravichandran, Dr. T.N. Shanmugam	Discrete Mathematics	Meenakshi agency 5th edition	2008
3	NarsinghDeo	Graph Theory with applications to engineering and computer science	Prentice hall of India, New Delhi, 2 nd	2003

Course Designed by	Dr. A. Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI103			Title	Batch:	2026– 2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	60	Core Lab I : Data structures Using C Lab	Semester:	I	
					Credits:	2	

Course Objective

- To Provide hands-on experience in C programming fundamentals including control structures, functions, recursion, arrays, strings, and pointers.
- To Enable students to design and implement algorithms for solving problems using basic and advanced data structures.
- To Familiarize students with file handling concepts and real-world data storage using C.
- To prepare students to face the challenges and opportunities in the IT industry by building strong foundations in C programming language.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Apply fundamental C programming concepts such as loops, recursion, arrays, and functions to solve basic computational problems.	PO1,PO2,PSO1
CO4	Analyze and implement data structures and searching/sorting algorithms using C programming.	PO1-PO4,PSO1
CO5	Design and develop programs using advanced concepts such as file handling, linked lists, stacks, queues, and algorithm optimization.	PO1-PO4,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO3	3	3	2	2	-	1	2	-	-	1	1	-	-	-	2	3	2
CO4	3	3	3	3	-	2	2	1	-	1	1	1	-	-	2	3	2
CO5	3	3	3	3	1	2	2	1	1	2	2	2	1	1	2	3	3

Content	
1. Write a C program that implements recursive function 2. Write a C program that implements a switch–case statement. 3. Write a C program that implements nested if else Statement. 4. Write a C program that implements a for loop. 5. Write a C program that implement While Loop. 6. Write a C program that implement Do-while Loop. 7. Write a C program that implements operations on string functions. 8. Write a C program using two-dimensional arrays. 9. Write a C program that implements Structures. 10. Write a C program that implements used defined function. 11. Write a C program that implements matrix addition using two-dimensional arrays. 12. Write a C program that implements the linear search algorithm on an array. 13. Write a C program that implements merging of two sorted arrays into a single sorted array. 14. Write a C program that implements swapping of two numbers using call by value and call by reference. 15. Write a C program that implements string operations such as concatenation, copying, reversing, and length calculation using string functions. 16. Write a C program to Implement a singly linked list with operations like insertion and deletion at the beginning. 17. Write a C program to Implement a stack using an array (push, pop, peek). 18. Write a C program to Implement a queue using an array (enqueue, dequeue). 19. Write a C program to Implement Bubble Sort to sort an array. 20. Write a C program to Implement Selection Sort to sort an array. 21. Write a C program to Implement Binary Search for an element in a sorted array. 22. Write a C program to Implement Quick Sort algorithm. 23. Write a C program to Implement Merge Sort algorithm. 24. Write a C Program to copy content from one file to another. 25. Write a C Program to count characters in a file.	
Total Hours 60	

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming in ANSI C	9th Edition , McGraw Hill Education (India)	2024
2	Yashavant Kanetkar	Let Us C	21 st Edition, BPB Publications, New Delhi	2025
3	Brian Kernighan & Dennis Ritchie	The C Programming Language	2 nd Edition, Pearson Education (Reprint), Noida	2023

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

SEMESTER II

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI204			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core III: Java Programming	Semester:	II
					Credits:	4

Course Objective

- To introduce the fundamentals of Java programming and object-oriented concepts.
- To develop problem-solving skills using Java.
- To build applications using Java libraries, GUI, and database connectivity.
- To apply Java programming concepts in AI/ML-related computational tasks.
- To explore computational aspects of Indian Knowledge Systems (IKS) through Java implementations.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand Java programming concepts including data types, variables, and command line arguments.	PO1,PO5,PSO1
CO2	Apply control structures, arrays, classes, and constructors to solve computational problems.	PO1-PO3, PO13,PSO1
CO3	Implement inheritance, polymorphism, interfaces, and packages in application development.	PO1-PO3, PO13,PSO1
CO4	Develop reliable programs using exception handling and multithreading concepts.	PO2,PO13, PSO1
CO5	Design real-world applications for preserving and managing Indian Knowledge Systems such as Vedas, Sanskrit texts, Yoga practices, and Ayurvedic knowledge using file handling, Unicode streams, and graphical components in Java.	PO1,PO3,PO5, PO11,PO13,PO 14,PSO1,PSO2

Mapping

CO \ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO1	3	2	2	—	3	—	—	1	1	—	2	1	3	—	—	3	2
CO2	3	3	3	1	2	—	—	2	1	—	2	1	3	1	—	3	2
CO3	3	3	3	2	2	—	—	2	1	—	2	2	3	1	1	3	2
CO4	2	3	2	2	2	—	—	2	1	—	2	2	3	2	—	3	2
CO5	3	2	3	2	3	—	—	2	2	1	3	2	3	3	2	3	3

Units	Content	Hrs
Unit I	Introduction to Java and Basic Programming: Evolution of Programming Languages - Overview and Features of Java - Java Architecture: JVM, JRE, JDK - Structure of a Java Program - Tokens, Keywords, Identifiers, Variables - Data Types and Literals - Operators and Expressions. Control Flow Statements: Decision Making (if, if-else, switch) - Looping (for, while, do-while) . Arrays and Strings in Java.	12
Unit II	Object-Oriented Programming in Java: Object-Oriented Programming Concepts - Classes and Objects - Constructors and Methods - Method Overloading - Encapsulation and Access Modifiers - Inheritance and Types of Inheritance - Method Overriding – Polymorphism - Abstract Classes and Interfaces -Packages and Java API.	13
Unit III	Exception Handling, Multithreading and File Handling: Exception Handling Concepts - try, catch, finally, throw and throws - User-defined Exceptions - Multithreading Concepts - Thread Lifecycle and Thread Class – Synchronization - Java Input/Output Streams - File Handling and Serialization.	12
Unit IV	Advanced Java Programming: Java Collections Framework - Generics in Java - Lambda Expressions - GUI Programming using AWT and Swing - Event Handling Mechanism - JDBC Architecture - Database Connectivity using Java -Introduction to Java Libraries for Data Processing.	11
Unit V	Java Applications: Networking Basics in Java - Socket Programming - Introduction to Web-based Java Applications - Java in Data Processing and Analytics - Simple Java-based application development. Integration of Indian Knowledge Systems (IKS) with Java: Vedic Mathematics Calculator using Java. Case Study: Panchang (Indian Astronomical Calendar) Computation.	12
	Total Hours	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Herbert Schildt	Java: The Complete Reference	12th Ed / McGraw Hill	2022
2	Cay S. Horstmann	Core Java Volume I – Fundamentals	12th Ed / Pearson	2022
3	Y. Daniel Liang	Introduction to Java Programming and Data Structures	12th Ed / Pearson	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kathy Sierra, Bert Bates, Trisha Gee	Head First Java	3rd Ed / O'Reilly	2022
2	Joyce Farrell	Java Programming	10th Ed / Cengage	2022

Web references

<https://www.javatpoint.com/java-tutorial>

<https://www.geeksforgeeks.org/java/>

<https://www.tutorialspoint.com/java/index.htm>

<https://www.programiz.com/java-programming>

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI205			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Operating Systems	Semester:	II
					Credits:	4

Course Objectives

- Understand core OS concepts like process, memory, storage management, protection, and security.
- Apply process management and scheduling techniques, and handle synchronization issues in multithreaded systems.
- Learn and implement memory management strategies (paging, segmentation) and resolve deadlock issues.
- Design and implement file systems, and compare the efficiency of different OS file systems
- Integrate Indian Knowledge Systems (IKS) with OS design, focusing on access control, ethical resource management, and security, inspired by ancient Indian educational systems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand problem-solving techniques and develop algorithms using iteration and recursion.	PO1, PO3, PO4, PSO1
CO2	Apply C programming fundamentals including data types, operators, expressions, and I/O operations.	PO1, PO2, PSO1
CO3	Implement decision-making constructs, loops, arrays, and string handling techniques.	PO1-PO3, PSO1
CO4	Design modular programs using user-defined functions, structures, and unions.	PO2, PO4, PSO1
CO5	Apply pointers and file handling techniques to manage data effectively and develop efficient programs.	PO1, -PO4, PSO1, PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	3	3	-	1	1	-	-	1	1	-	-	-	2	3	2
CO2	3	3	2	2	-	1	2	-	-	1	1	-	-	-	2	3	2
CO3	3	3	3	2	-	2	2	1	-	1	1	-	-	-	2	3	2
CO4	2	3	2	3	-	2	2	1	-	2	2	1	-	-	2	3	2
CO5	3	3	3	3	1	2	2	1	1	2	2	2	1	1	2	3	3

Unit	Contents	Hours
I	OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems. OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.	12
II	PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, Multithreaded programming, threads in UNIX. CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, atomic transactions.	12
III	DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing.	12
IV	FILE SYSTEM: Concept of a file, access methods, directory structure, file-system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.	12
V	Mass-Storage Structure: Disk Structure - Disk scheduling – Disk management – Swap - Space management I/O Systems: I/O Hardware – Application I/O Interface – Kernel I/O Subsystem – Transforming I/O Request to Hardware Operations – STREAMS–Ancient Indian Data Organization - Record Keeping Systems - Indian Contributions to Computing Concepts Case Study: Access Control in Ancient Indian Educational Systems	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abraham Silberschatz, Peter B. Galvin & Greg Gagne	Operating System Concepts	10th Edition (Global ed.), Wiley India, New Delhi	2024
2	Andrew S. Tanenbaum & Herbert Bos	Modern Operating Systems	5 th Edition. Pearson Education, Noida	2023
3	William Stallings	Operating Systems: Internals and Design Principles	9 th Edition, Pearson Education	2018 (Reprint 2025)
4	Achyut S. Godbole & Atul Kahate	Operating Systems	4 th Edition, McGraw Hill Education, Noida	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Maurice J. Bach	The Design of the UNIX Operating System	1 st Edition, PHI Learning, Delhi	2021 (Reprint)
2	T.R.N. Rao & Subhash Kak	Computing Science in Ancient India	2 nd Edition, Mount Meru Publishing, Canada/India	2023

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI2A1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	GE II- Allied II: Probability and Statistics	Semester:	II
					Credits:	4

Course Objective

- This course has been designed for students to learn and understand
- Basic concepts of Probability theory
- Apply the concepts to solve the probability problems
- Concepts of Regression and Correlation

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	PO1,PSO1
CO2	Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.	PO1,PO2,PO4,PSO1
CO3	Apply the concept of testing of hypothesis for small and large samples in real life problems	PO1-PO4,PSO1
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.	PO1-PO4,PSO1
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and Management problems.	PO1,PO2,PO4,PO12,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	1	2	2	–	–	–	–	–	–	2	–	–	–	3	1
CO2	3	3	2	3	2	–	–	–	–	–	–	2	–	–	–	3	2
CO3	3	3	3	3	2	–	–	–	1	1	–	2	1	–	–	3	2
CO4	3	3	3	3	2	1	1	–	1	1	–	2	1	–	–	3	2
CO5	3	3	2	3	2	–	–	–	1	1	–	3	1	–	–	3	2

Units	Content	Hrs
Unit I	Probability: Introduction – Definition - Addition and multiplicative theorem – The axioms of probability – Conditional probability – multiplicative law of probability – Baye’s theorem – Simple problems. Chapter 1: sections: 1.1 to 1.11.	15
Unit II	Measures of averages: Introduction – Arithmetic mean (AM) – weighted AM – formula for calculating AM in a frequency distribution – properties of AM- combined mean (CM) – geometric mean (GM) – harmonic mean (HM)-median – quartiles– mode – merits and demerits – mean, median and mode– Standard Deviation – simple problems. Chapter 5 (Part II – Statistical methods): sections: 5.1 to 5.23.	15
Unit III	Large samples: Population – sample – sampling distribution – sampling distribution of mean – characteristics of a sampling distribution – central limit theorem – test of hypothesis – procedure – Test for a specified mean – Test for equality of two means – simple problems. Chapter 24: sections: 24.1 to 24.16. Small samples:t-test: Definition – uses – properties of the sampling distributions of t – Test for a specified mean – simple problems. Chapter 25: sections: 25.1 to 25.13.	16
Unit IV	Small samples:F-test: Definition – procedure for the test of two population variances- simple problems. Analysis of variance: Introduction - One way and Two-way classifications – simple problems. Chapter 26: sections: 26.1 to 26.28.	14
Unit V	Chi square-test: Definition – uses – procedure for testing the significance difference between the observed and expected frequencies – test of independence of attributes – test procedure - Test for a specified population variance – simple problems. Chapter 27: sections: 27.1 to 27.35. Regression: Introduction – deviation of regression lines – properties of regression coefficients – simple problems. Chapter 9: sections: 9.1 to 9.25.	15
	Total Hours	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	P.R.Vittal	“Mathematical Statistics”	12th Edition, Margham Publications, Chennai	2020

Reference Books

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert. V. Hogg and Allen T.G. Craig	“Introduction to Mathematical Statistics”,	5th edition, Pearson Education	2006
2	Suddhebdubiswas and G.L. Sriwastav.	“Mathematical Statistics”,	1st Edition, Narosa Publishing House Pvt. India.	2009
3	Nabebdu Pal and SahadebSarkar	”Statistics	2nd Edition, Prentice Hall of India, New Delhi	2009
4	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying E. Ye,	“Probability and Statistics for Engineers and Scientists	9th edition, Pearson Education	2006

Course Designed by	Dr.A.Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI2A2			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	GE II- Allied II: Optimization Techniques	Semester:	II
					Credits:	4

Course Objectives

- Mathematical Foundation course Solves
- Modeling linear programs and solving with a computer
- Simplex algorithms to solve linear programs
- Other algorithms for linear programming
- Integer Programming, Network problems, Non-linear programming

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	To remember the basic principles and practices of computing grounded in mathematics and science	PO1,PSO1
CO2	To understand the Problems using various linear Algorithms	PO1,PO2,PSO1
CO3	To apply algorithms to the decision making problems	PO1,PO2,PO3,PSO1
CO4	To Analyze the programming algorithms with exercises	PO1,PO2,PO4,PSO1
CO5	To Summarize the inventory and queuing models	PO1,PO3,PO12,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	1	1	2	—	—	—	—	—	—	2	—	—	—	3	1
CO2	3	3	2	2	2	—	—	—	—	—	—	2	—	—	—	3	2
CO3	3	3	3	2	2	1	—	—	1	1	—	2	1	—	—	3	2
CO4	3	3	2	3	2	—	—	—	1	1	—	2	1	—	—	3	2
CO5	3	2	3	2	2	1	1	—	1	1	—	3	1	—	—	3	2

Units	Content	Hrs
Unit I	Introduction: Simplex method – Graphical method – Standard form – IBFS- Artificial Variable technique – Big M Method.	15
Unit II	Transportation : Mathematical formulation – Initial feasible solution – North – West Corner Method – Matrix minima method – Vogel’s approximation method – Optimized basic feasible solution- Solution by UV method Assignment Problem : Introduction – Definition – Assignment algorithm – Balanced Assignment Problem – Unbalanced Assignment problem – Hungarian Method	16
Unit III	Networks : Networks and basic components – rules – time calculation in networks – CPM – PERT – PERT Calculations- Resource analysis in network scheduling project cost – time cost optimization algorithm	14
Unit IV	Inventory : Introduction – Reasons for carrying Inventory – Type of Inventories – The Inventory decision – EOQ with no Shortages – Production problem with no shortages – EOQ with Shortages – Production problem with shortages- EOQ with Price Breaks – EOQ with no price breaks – EOQ with two price breaks	16
Unit V	Sequencing : Introduction- problems of sequencing – problems with n jobs and two machines – Problems with n jobs and three machines – problems with n jobs and m machines Replacement Theory : Introduction – replacement of equipment or asset the deteriorates gradually – replacement of equipment that fails suddenly	14
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kanti Swarup, P. K. Gupta and Man Mohan,	Operations Research	Sultan Chand & Sons Educational Publishers, New Delhi	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	P.K. Gupta, D.S. Hira	Problem in Operations Research	S.Chand & Company Ltd	2007
2	J.K. Sharma	Operations Research Theory and Applications	Third Edition, Macmillan India Ltd	2006
3	Hamdy A. Taha	Operations Research : An Introduction	Eight Edition PHI, New Delhi,	2008

Course Designed by	Dr.A.Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI206			Title	Batch:	2026–2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab II Java Programming Lab	Semester:	II
					Credits:	2

Course Objective

- Provide hands-on experience in implementing Java programming concepts such as classes, packages, interfaces, exception handling, threading, and file processing.
- Develop problem-solving skills through practical implementation of mathematical, string, and real-time applications using Java.
- Enable students to design modular and multithreaded applications using advanced Java concepts like packages, interfaces, and file handling.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Develop Java programs using object-oriented concepts, packages, and interfaces.	PO2,PO3,PO5,PO11,PO13, PSO1
CO4	Apply exception handling, multithreading, and file operations to build robust applications.	PO2-PO4,PO11,PSO1
CO5	Design real-time applications using modular programming and data processing techniques.	PO2-PO4,PO11,PSO1,PSO2

Mapping

CO PO PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PO13	PO14	PO15	PSO 1	PSO 2
CO3	2	3	3	2	3	—	—	2	2	1	3	2	3	2	2	3	2
CO4	2	3	3	3	2	1	2	2	2	1	3	2	2	1	2	3	2
CO5	2	3	3	3	2	2	2	2	2	2	3	2	2	2	2	3	3

Content
1. Write a Java program to demonstrate the structure of a Java program, use variables, different data types, and perform simple arithmetic operations. 2. Write a Java program to demonstrate operators and expressions including arithmetic, relational, logical, and assignment operators. 3. Write a Java program to implement decision-making statements using if, if-else, and switch statements. 4. Write a Java program to demonstrate looping constructs (for, while, and do-while) to generate multiplication tables. 5. Write a Java program to perform operations on arrays such as finding the largest, smallest, and average of elements. 6. Write a Java program to demonstrate string operations such as concatenation, length, substring, and comparison. 7. Write a Java program to create a class and objects for a Student with attributes and methods to display student details. 8. Write a Java program to demonstrate constructors and method overloading. 9. Write a Java program to demonstrate encapsulation using private variables and getter/setter methods. 10. Write a Java program to implement inheritance and demonstrate different types of inheritance. 11. Write a Java program to demonstrate method overriding and runtime polymorphism. 12. Write a Java program using abstract classes and interfaces. 13. Write a Java program to demonstrate exception handling using try, catch, and finally. 14. Write a Java program to create and use user-defined exceptions. 15. Write a Java program to perform file handling operations such as reading and writing data to a file. 16. Write a Java program to demonstrate multithreading using the Thread class and Runnable interface. 17. Write a Java program to demonstrate thread synchronization. 18. Write a Java program to demonstrate Java Collections Framework using ArrayList, HashSet, and HashMap. 19. Write a Java program to demonstrate JDBC connectivity to insert and retrieve records from a database. 20. Write a Java program to implement client-server communication using socket programming.
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I - Fundamentals	Oracle Press Java, 12 th Edition.	2022
2	R.NageswaraRao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
3	H. Schildt	Java2 The Complete Reference	MCGraw Hill, 11 th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	The Java Programming Language	Addison Wesley,4 th Edition	2005

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI2S1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	SEC-I: Naan Mudhalvan: Front end UI/UX Development	Semester:	II
					Credits:	2

Course Objective

- Provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, Usability testing methods, interface technologies and user centered design in corporate perspective.
- To analyze the iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.
- Provide Exposure to wireframing and Prototyping software in the various UI/UX Design tools

Course Outcome

CO Number	CO Statement	PO Mapping
CO3	Build UI for user Applications	PO3,PO5,PO9,PO10,PSO1
CO4	Evaluate UX design of any product or application	PO2,PO4,PSO2
CO5	Demonstrate UX Skills in product development	PO3,PO5,PO9,PO10,PO12,PSO1,PSO2

Mapping

CO PO PSO	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	2	2	3	2	3	1	—	—	3	3	1	2	1	1	1	3	2
CO4	2	3	2	3	2	1	—	—	2	2	—	2	1	1	1	2	3
CO5	2	2	3	2	3	1	—	—	3	3	1	3	2	2	2	3	3

Content	Hrs
Program 1: Create a basic HTML structure (header, footer, body) Program 2: Create a simple webpage with HTML tags (headings, paragraphs, links, images) Program 3: Create a wireframe for a simple website (Home page, About Us page, Contact page) using Figma or Sketch Program 4: Design a simple button and form UI with CSS Program 5: Build a personal profile page using basic HTML (name, photo, short biography, contact form) Program 6: Design a contact form with HTML input elements (text, email, password) Program 7: Style the personal profile page with CSS (add colors, fonts, layout) Program 8: Create a simple navigation bar using CSS (horizontal or vertical) Program 9: Create a responsive layout using Flexbox (e.g., card design or grid gallery) Program 10: Build a responsive website using Bootstrap or Tailwind CSS (landing page example) Program 11: Create an interactive webpage with JavaScript (a button that changes the background color) Program 12: Build a simple form validation script (validate if the input field is filled) Program 13: Create a dynamic image gallery with JavaScript (click to open a modal view) Program 14: Build an interactive to-do list (add, delete, mark completed) Program 15: Create a slide-in menu using CSS animations Program 16: Implement an image carousel (JavaScript or CSS-based) Program 17: Redesign an existing website (improve typography, layout, and color schemes) Program 18: Create a user persona and design a wireframe based on it Program 19: Create a mobile-first website that adapts to tablets and desktop using media queries Program 20: Build a fully responsive landing page (use Flexbox, Grid, and media queries) Program 21: Test an existing webpage for accessibility using Lighthouse or WAVE tool Program 22: Redesign a website to meet WCAG 2.0 accessibility standards Program 23: Create a simple "To-Do" app using React (CRUD operations) Program 24: Build a static website with React, implementing React Router for navigation Program 25: Build a weather app that fetches data from a weather API (using fetch/Axios) Program 26: Develop a React app with state management (e.g., Shopping Cart) Program 27: Develop a full-stack project (e.g., Blog, Portfolio, or E-commerce site) incorporating responsive design, UI/UX principles, and React Program 28: Final project presentation and code walkthrough with peer review	30
Total Contact Hrs	30

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joel Marsh,	UX for Beginners,	OReilly	2024
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product & Services	OReilly	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA, (2nd. ed.).	2012
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007Third Edition.	2007

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI2S2			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem .	30	SEC I: NaanMudhalvan : Industry 5.0	Semester:	II	
					Credits:	2	

Course Objective

- To introduce the basic framework, components, and technologies of 5.0.
- To provide understanding of AI, Big Data, IoT, and Cloud Computing in Industry 5.0.
- To develop the ability to apply and evaluate Industry 5.0 technologies with sustainability and IKS perspectives.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain the concepts and principles of Industry 5.0	PO1,PO2,PO9
CO2	Describe AI, Big Data, IoT, and Cloud technologies in Industry 5.0	PO7,PSO1
CO3	Apply modern technologies to solve real-world industrial problems	PO1-PO7,PSO1,PSO2
CO4	Analyze Industry 5.0 applications across various domains	PO3,PO6,PO14,PSO1,PSO2
CO5	Evaluate and integrate IKS principles with Industry 5.0 solutions	PO9,PO14,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	2	1	2	1	—	—	—	—	2	1	—	—	—	2	1	2	2
CO2	2	2	2	2	2	2	3	1	2	1	—	—	—	2	1	3	2
CO3	3	3	3	3	3	3	3	2	2	2	2	2	1	2	2	3	3
CO4	2	2	3	2	2	3	2	2	2	2	2	1	1	3	2	3	3
CO5	1	1	2	1	1	2	1	2	3	2	2	1	2	3	2	3	3

Units	Content	Hrs
Unit I	Evolution of industrial revolutions (1.0–5.0), principles of Industry 5.0 (human-centricity, sustainability, resilience), comparison with Industry 4.0, cyber-physical systems, digital twins, human–AI collaboration.	6
Unit II	Artificial Intelligence in Industry 5.0 – AI fundamentals, perception to prediction to decision-making, machine learning and deep learning basics, predictive analytics, explainable AI, ethical issues, societal impact, AI tools and applications.	6
Unit III	Big Data and IoT – data evolution, types, Big Data characteristics (5Vs), data lifecycle, Hadoop and Spark frameworks, IoT architecture, sensors, communication technologies, edge computing, IoT application development, security.	6
Unit IV	Cloud Computing and applications – cloud service models (IaaS, PaaS, SaaS), deployment models, platforms (AWS, Azure, GCP), role in AI, IoT, Big Data, applications in manufacturing, healthcare, agriculture, education, transportation, and logistics.	6
Unit V	Smart systems and sustainability – smart agriculture, green technologies, lean production, human–robot collaboration, circular economy; IKS with Industry 5.0 – principles of sustainability and decentralization, application in smart agriculture combining AI with traditional practices, case study on smart supply chain inspired by ancient Indian trade systems using AI, IoT, and blockchain.	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Alp Ustundag & EmreCevikcan	Industry 4.0: Managing The Digital Transformation	2 nd Edition , Springer, Cham (CH)	2024
2	Stuart Russell & Peter Norvig	Artificial Intelligence: A Modern Approach	5 th Edition, Boston	2025
3	Raj Kamal	Internet of Things: Architecture and Design Principles	2 nd Edition , McGraw Hill, Noida	2023
4	Min Chen & Kai Hwang	Big Data Analytics for Cloud, IoT and Cognitive Computing	2 nd Edition , Wiley, New York	2024

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kanchan Sharma	Ancient Indian Trade and Commerce	Revised Edition, Kanishka Publishers, New Delhi	2023
2	S. Nayak& K. Anand	Smart Agriculture: Emerging Technologies (IoT& AI)	1 st Edition,CRC Press, Florida	2022

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI2VA			Title	Batch:	2026 - 2029
				VAC –I A Practical approach for Statistical problems using AI and Machine Learning	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30		Credits:	2

Course Objective

- The objectives of this course are to have a practical understanding about Statistical technique using python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Apply Python statistical libraries to compute descriptive statistics such as measures of central tendency, variability, and summary statistics for datasets.	PO1,PO6,PO7,PSO1
CO4	Analyze relationships between variables using correlation measures and interpret statistical results using Python tools.	PO1,PO3, PO6,PO7,PSO1
CO5	Design and visualize data representations using plots such as histograms, box plots, pie charts, bar charts, heatmaps, and X–Y plots for effective data interpretation.	PO3,PO6,PO7,PO10,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	3	2	2	2	2	3	3	1	-	1	1	-	-	1	2	3	2
CO4	3	2	3	2	2	3	3	2	-	2	1	1	-	1	2	3	2
CO5	2	2	3	2	1	3	3	2	1	3	2	1	1	2	2	3	3

Units	Content	Hrs
Unit I	Introduction to Descriptive Statistics -Types of Measures -Population and Samples- Outliers -Choosing Python Statistics Libraries Getting Started With Python Statistics Libraries -Calculating Descriptive Statistics	10
Unit II	Measures of Central Tendency -Measures of Variability-Summary of Descriptive Statistics-Measures of Correlation Between Pairs of Data Working With 2D Data -Axes-DataFrames	10
Unit III	Visualizing Data :Box Plots-Histograms-Pie Charts-Bar Charts-X-Y Plots- Heatmaps	10
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Wes McKinney	Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter	3 rd Edition, O'Reilly Media / Shroff, Noida	2022 (Reprint 2025)
2	Jake VanderPlas	Python Data Science Handbook: Essential Tools for Working with Data	2 nd Edition, O'Reilly Media, USA/India	2023 (Reprint 2026)

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education 1st Edition	2016
2	Allen B. Downey	Think Stats: Exploratory Data Analysis	3 rd Edition, O'Reilly Media	2024

Web references

<https://www.tutorialspoint.com/python/index.htm>

<https://www.javatpoint.com/library-in-python>

<https://www.geeksforgeeks.org/libraries-in-python/>

<https://www.geeksforgeeks.org/descriptive-statistic/>

https://www.tutorialspoint.com/python_pandas/python_pandas_descriptive_statistics.html

Course Designed by	Dr. B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

SEMESTER III

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI307			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core V: Python Programming	Semester:	III	
					Credits:	4	

Course Objective

- To develop problem-solving skills using Python.
- To build strong foundations in object-oriented and modular programming.
- To introduce data handling, visualization, and scientific computing using Python libraries.
- To expose students to Python applications in AI & ML.
- To integrate Indian Knowledge Systems (IKS) concepts with computational thinking.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain Python fundamentals and data science concepts	PO1,PO2,PO3
CO2	Apply Python programming for data manipulation and analysis	PO1,PO2
CO3	Use libraries like NumPy, Pandas, and Matplotlib for data processing and visualization	PO2,PO3
CO4	Analyze datasets and build basic predictive models using Python tools	PO4,PO6
CO5	Evaluate and interpret data-driven solutions for real-world problems and Integrate Indian Knowledge Systems (IKS) with Python programming to encourage structured thinking, abstraction, logical reasoning, and ethical computing practices.	PO2,PO3,P15

Mapping

CO PO PSO	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO1	2	2	1	1	–	1	1	–	1	1	–	–	–	1	1	2	1
CO2	3	3	2	2	2	3	3	1	1	2	1	1	–	1	2	3	2
CO3	3	3	2	2	2	3	3	1	1	2	1	1	–	1	2	3	2
CO4	3	2	3	2	3	3	2	2	2	2	2	1	1	2	2	3	3
CO5	2	2	3	2	2	3	2	2	3	3	2	2	2	3	3	3	3

Units	Content	Hrs
Unit I	Introduction: Features of Python - Installation and Execution Modes - Python IDEs -Identifiers - Keywords - Statements and Expressions - Variables - Operators - Precedence and Associativity - Data Types - Indentation - Comments - Reading Input - Print Output - Type Conversions - The type() Function and Is Operator - Dynamic and Strongly Typed Language. Control Flow Statements - Functions: Built-In Functions - Commonly Used Modules - Function Definition and Calling the Function - The return Statement and void Function- Scope and Lifetime of Variables- Default Parameters - Keyword Arguments - *args and **kwargs - Command Line Arguments.	12
Unit II	Strings : Creating and Storing Strings - Basic String Operations - Accessing Characters in String by Index Number - String Slicing and Joining - String Methods - Formatting Strings – Lists: Creating Lists - Basic List Operations - Indexing and Slicing in Lists - Built-In Functions Used on Lists - List Methods - The del Statement.	11
Unit III	Dictionaries: Creating Dictionary - Accessing and Modifying key:valuePairs in Dictionaries - Built- In Functions Used on Dictionaries - Dictionary Methods - The del Statement - Tuples and Sets:Creating Tuples - Basic Tuple Operations - Indexing and Slicing in Tuples - Built-In Functions Used on Tuples - Relation between Tuples and Lists -Relation between Tuples and Dictionaries - Tuple Methods - Using zip() Function - Sets - Set Methods – Frozenset.	12
Unit IV	Files: Types of Files - Creating and Reading Text Data - File Methods to Read and Write Data - Reading and Writing Binary Files - The Pickle Module - Reading and Writing CSV Files - Python os and os.path Modules. Object-Oriented Programming: Classes and Objects - Creating Classes in Python -Creating Objects in Python - The Constructor Method - Classes with Multiple Objects - Class Attributes versus Data Attributes - Encapsulation - Inheritance - The Polymorphism	12
Unit V	Python Ecosystem for AI & ML - Data Science Libraries: NumPy - Arrays and Array Operations - Indexing, Slicing - Mathematical and Statistical Functions- Pandas -Series and DataFrame - Data Visualization – Matplotlib – Seaborn - Line, Bar, Pie, Histogram, Scatter Plots- JSON. Indian Knowledge Systems (IKS) Mapping with Python Programming: Application Area: Data-driven analysis of traditional medicine datasets. Python Libraries: Pandas – NumPy - Matplotlib Case Study: Dataset containing: Patient symptoms - Dosha classification (Vata, Pitta, Kapha) - Treatment response - Data cleaning- Pattern identification - Visualization of treatment effectiveness - Applying modern data science tools to traditional healthcare knowledge.	13
	Total Hours	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Gowrishankar, A. Veena,	Introduction to Python Programming	CRC Press Taylor and Francis Group, 1st Edition	2018
2	Mohd. Abdul Hameed	Python for Data Science	Wiley India, 1st edition	2021
3	Reema Thareja	Python Programming Using Problem-Solving Approach	Oxford University Press India, 3rd Edition	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Problem Solving and Python Programming	McGraw Hill Education 1st Edition	2018
2	Wes McKinney	Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter	Shroff/O'Reilly Media, 3rd Edition	2022
3	Dr. Chandrika M & Dr. Pavithra B. Shetty	Python Fundamentals for Data Analytics	1st Edition, BPB Publications	2024

Web References

Python Docs: <https://docs.python.org/3/>

NumPy: <https://numpy.org/doc/>

Pandas: <https://pandas.pydata.org/docs/>

scikit-learn: https://scikit-learn.org/stable/user_guide.html

<https://www.python.org/about/gettingstarted/>

<https://www.geeksforgeeks.org/python-programming-language-tutorial/>

<https://www.programiz.com/python-programming>

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI308			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	CC VI : Artificial Intelligence	Semester:	III
					Credits:	4

Course Objectives

- Understand the fundamentals, history and future scope of Artificial Intelligence.
- Learn intelligent agents, rationality, PEAS representation and environment structures.
- Apply problem solving techniques using uninformed and informed search strategies.
- Analyze adversarial search, CSP, logical reasoning and decision making.
- Explore real world AI applications including NLP, Speech Recognition and Indian Knowledge Systems (IKS).

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain AI concepts, intelligent agents, rationality and PEAS representation.	PO1,PO12
CO2	Apply search techniques to solve AI problems.	PO1- PO3,PO12,PSO1
CO3	Analyze game playing and constraint satisfaction problems.	PO1- PO3,PO12,PSO1
CO4	Demonstrate logical reasoning using propositional and first-order logic.	PO1,PO2, PO12,PSO1
CO5	Evaluate AI applications including NLP, speech recognition and IKS-based systems.	PO3,PO5, PO11,PO12,PO15,P SO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	–	2	–	–	1	1	–	2	3	1	–	–	2	1
CO2	3	3	3	2	2	–	–	2	1	–	2	3	1	1	–	3	2
CO3	3	3	3	2	2	–	–	2	1	–	2	3	1	1	2	3	2
CO4	3	3	2	2	2	–	–	2	1	–	2	3	1	1	1	3	2
CO5	2	2	3	2	3	–	–	2	2	1	3	3	2	2	3	3	2

Unit	Contents	Hours
I	INTRODUCTION TO AI: Introduction–Definition – History of AI - Future of Artificial Intelligence – Intelligent Agents: Agents & Environments-The Concept of Rationality – The Nature of Environments - PEAS representation for an Agent–The structure of Agents - Problem Solving Approach to Typical AI problems	12
II	PROBLEM SOLVING: Solving problems by Searching – Problem solving Agents- Example Problems –Searching for Solutions - UninformedSearch Strategies–Informed (Heuristics) Search Strategies – Local Search Algorithms and Optimization Problems -Searching with Partial Observations Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems - Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Game	12
III	ADVERSARIAL SEARCH: Games - Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games - Partially observable games CONSTRAINT SATISFACTION PROBLEMS: Defining Constraint Propagation problems – inference in CSP's - Backtracking Search for CSP's – Local search for CSP's- The Structure of Problems	12
IV	LOGICAL AGENTS: Knowledge Based Agents - Propositional Logic – Propositional Theorem proving- Propositional model Checking - Agents based on propositional logic - FIRST ORDER LOGIC: Syntax and Semantics of First Order Logic – Using First Order Logic-Knowledge Engineering in First Order Logic–Inferences in first-order logic - Unification – Forward Chaining-Backward Chaining – Resolution	13
V	AI Applications : Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition. IKS Implementation in Application: Search engines and digital libraries. Case Study: AI-based manuscript search system.	11
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Artificial Intelligence: A Modern Approach	Stuart Russell & Peter Norvig	4 th Edition, Pearson	2020
2	AI for Everyone: An Undergraduate Q&A Guide	Dr. Shyam Sarkar	1st Edition, Wiley/KDP	2025
3	A Textbook of AI (Aligned with NEP 2020)	Hema Dhingra	Revised, Sultan Chand	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Hands-On ML with Scikit-Learn & TensorFlow	Aurélien Géron	3rd Edition, O'Reilly	2022
2	The Hundred-Page Machine Learning Book	Andriy Burkov	1st Edition, Leanpub	2020

Web references

<https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/>

<https://www.javatpoint.com/artificial-intelligence-ai>

<https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf>

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI3A1			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	75	GE III-Allied III : Discrete Structures and its Applications	Semester:	III	
					Credits:	4	

Course Objectives

- Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
- Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.
- Introduce students to prove mathematical statements by means of inductive reasoning

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	PO1,PSO1
CO2	Demonstrate an understanding of relations ,functions, Combinatorics and lattices	PO1,PSO1
CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	PO1,PO3-PO6, PO8,PSO1
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	PO1,PO3-PO6, PO8,PO15,PSO1
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	PO1,PO3-PO6, PO8,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	2	1	1	–	–	–	–	1	–	1	1	–	–	–	1	2	1
CO2	3	1	2	2	2	1	–	2	–	1	1	–	–	–	2	3	2
CO3	3	2	3	3	2	2	–	3	–	2	2	–	–	–	2	3	2
CO4	3	1	3	3	3	3	–	3	–	2	2	–	–	–	3	3	2
CO5	3	1	3	3	3	3	–	3	–	2	2	–	–	–	3	3	2

Unit	Course contents	Hours
I	Relations: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	15
II	Coding Theory: Introduction – Hamming distance – Encoding a Message – Group codes – Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	16
III	Mathematical Logic: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	14
IV	Graph Theory : Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal's algorithm to find an optimal tree of a weighted graph.	15
V	Number Theory: Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid's theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	15
Total		75

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr.M.K.Venkataraman, Dr.N.Sridharan, N. Chandarasekaran (Unit – I, II, III)	“Discrete Mathematics”	The National Publishing Company, Chennai	2006
2	S.Kumaravelu&Susheela Kumaravelu (Unit – IV)	“Graph Theory”	JankiCalender Corporation, Sivakasi	1999
3	S.Kumaravelu&Susheela Kumaravelu (Unit – V)	“Elements of Number Theory”	Raja Sankar offset Printers, Sivakasi	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	“Discrete Mathematical Structures with Applications to Computer Science”	Tata McGraw Hill Education	2007
2	NarsinghDeo	Graph Theory with applications to engineering and computer science	Prentice hall of India, New Delhi	2003

Course Designed by	Dr. A. Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI3A2			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		GE III – Allied III: Numerical Techniques	Semester:	III
					Credits:	4

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non-linear differential equations when ordinary analytical methods fail.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand the need of numerical analysis techniques in the areas of approximation theory, and recall some basic concepts.	PO1
CO2	Apply the numerical methods for approximating the solution to problems of algebraic and transcendental equations, simultaneous linear equations.	PO1,PO3-PO5,PO8,PSO1
CO3	Estimating the value of a function for any intermediate value of the independent variable using Newton Forward and Backward interpolation Formula as well compute the derivatives using Newton's forward and backward difference formula and Sterling's formula.	PO1,PO3-PO5,PO8,PSO1
CO4	Solve the ordinary and partial differential equations by using Numerical method techniques like Taylors method, Euler's method, RungeKutta method etc.	PO1,PO3-PO5,PO8,PSO1
CO5	Enrich the knowledge of numerical techniques and getting insight of algorithmic approach.	PO1,PO3-PO5,PO8,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	1	2	–	–	2	–	1	1	–	–	–	1	2	1
CO2	3	1	3	3	3	2	–	3	–	2	1	–	–	–	1	3	2
CO3	3	1	3	3	3	2	–	3	–	2	1	–	–	–	1	3	2
CO4	3	1	3	3	3	2	–	3	–	2	1	–	–	–	1	3	2
CO5	3	1	3	3	3	3	–	3	–	2	2	–	–	–	2	3	2

Units	Content	Hrs.
Unit I	Simultaneous Linear Algebraic Equations: Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study). Chapter 4: Sections: 6, 7.	11
Unit II	Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. Chapter 6: Sections: 1 - 5	10
Unit III	Numerical Solution of Ordinary Differential Equations: Solution by Taylor Series - Taylor Series method for higher order differential equations- Chapter 11: Sections: 6, 8,	10
Unit IV	Numerical Solution of Ordinary Differential Equations: Euler's method - Improved Euler's method - Modified Euler method. Chapter 11: 10 - 12.	10
Unit V	Numerical Solution of Ordinary Differential Equations: - RungeKutta method - Second order RungeKutta Method - Higher order RungeKutta methods. Chapter 11: 13 - 15.	11

Pedagogy

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Venkataraman M. K	“Numerical Methods in Science and Engineering”	The National Publishing Company, Madras	2009

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kandasamy P, Thilagavathy K and Gunavathi K	“Numerical Methods”	S. Chand company Ltd	2012

Course Designed by	Dr. A. Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI309			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab III Python Programming Lab	Semester:	III
					Credits:	2

Course Objective

To give a basic introduction to object-oriented and to demonstrate the concepts of Artificial Intelligence and Data science, using Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Enable students to effectively use Python data structures and standard libraries.	PO1-PO3,PSO1
CO4	Provide knowledge of object-oriented programming, file handling, and exception handling in Python.	PO1-PO4,PS01
CO5	Integrate Indian Knowledge Systems (IKS) with Python programming to encourage structured thinking, abstraction, logical reasoning, and ethical computing practices.	PO3,PO9,PSO1,P SO2

Mapping

CO / PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	3	3	3	2	2	2	2	1	1	1	2	1	–	1	2	3	2
CO4	3	3	3	3	2	2	2	1	2	1	2	1	–	1	2	3	2
CO5	2	2	3	2	1	1	1	2	3	2	2	1	1	2	2	3	3

Units	Content
	1. Program to find the factorial of a number using recursion 2. Program to implement the control structures 3. Program to implement the list 4. Program to implement the operations and methods of the String 5. Program to implement the Tuples 6. Program to implement the Dictionaries 7. Program to import and use the system libraries 8. Program to implement the modules 9. Program to implement the standard modules 10. Program to implement Exceptions and Error handling 11. Program to implement Objects and Class 12. Program to demonstrate File handling 13. Program to create a CSV file 14. Program to read and write a CSV file 15. Program to demonstrate JSON 16. Program to demonstrate Numpy 17. Program to Demonstrate Pandas
	Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Gowrishankar, A. Veena,	Introduction to Python Programming	CRC Press Taylor and Francis Group, Ist Edition	2018
2	Mohd. Abdul Hameed	Python for Data Science	Wiley India, 1st edition	2021
3	Reema Thareja	Python Programming Using Problem-Solving Approach	Oxford University Press India, 3rd Edition	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Problem Solving and Python Programming	McGraw Hill Education 1st Edition	2018
2	Wes McKinney	Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter	Shroff/O'Reilly Media, 3rd Edition	2022

3	Dr. Chandrika M & Dr. Pavithra B. Shetty	Python Fundamentals for Data Analytics	1st Edition, BPB Publications	2024
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Web References

Python Docs: <https://docs.python.org/3/>

NumPy: <https://numpy.org/doc/>

Pandas: <https://pandas.pydata.org/docs/>

scikit-learn: https://scikit-learn.org/stable/user_guide.html

<https://www.python.org/about/gettingstarted/>

<https://www.geeksforgeeks.org/python-programming-language-tutorial/>

<https://www.programiz.com/python-programming>

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	26UAI310			Title	Batch:	2026-2029
				Title Core Lab IV : AI Lab	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	60		Credits:	2

Course Objective

- Understand problem-solving techniques using classical AI approaches.
- Implement search algorithms and intelligent agent models.
- Apply AI techniques to solve real-world problems using Python.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Implement classical AI problems such as Water Jug, TSP, and Map Coloring using programming techniques.	PO1,PO3,PO13,PSO1
CO4	Apply search strategies like DFS, BFS, and Hill Climbing to solve AI problems.	PO1-PO3,PO5,PO13,PSO1
CO5	Design and simulate intelligent agents such as Simple Reflex, Model-Based, Goal-Based, and Utility-Based agents.	P02,PO3,PO5,PO11,PO13, PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	3	2	3	–	3	–	–	2	2	–	2	2	3	–	–	3	2
CO4	3	3	3	2	3	–	–	2	2	–	2	2	3	2	–	3	2
CO5	2	3	3	2	3	–	–	2	2	2	3	2	3	2	2	3	2

Content	
1. Write a Python Program to implement the Water jug Problem. 2. Write a Python program to Implement Travelling Salesman Problem. 3. Write a Python Program to implement the Depth first Search Traversal. 4. Write a Python Program to implement the Breadth first Search Traversal. 5. Write a Python Program to implement Map Colouring. 6. Write a Python Program to emulate Simple-Reflex agent. 7. Write a Python Program to emulate Utility-Based Reflex agent. 8. Write a Python Program to emulate Goal-Based agent. 9. Write a Python Program to emulate Model-Reflex agent. 10. Write a Python Program to Implement Hill-Climbing. 11. Write a simple Learning Agent program that improves its decision after each trial. 12. Write a Python Program to simulate a two-room vacuum cleaner environment using intelligent agents. 13. Write a Python program to implement a Table-Driven Agent that selects actions from a predefined table. 14. Write a Python Program to implement a simple Tic-Tac-Toe playing agent. 15. Write a Python Program to implement a simple reinforcement learning agent. 16. Write a Python Program to implement a traffic light control agent. 17. Write a Python Program to implement an agent that adjusts temperature in a smart home. 18. Write a program for path finding using an intelligent agent. 19. Write a Python program to solve the 8-Puzzle problem using a search algorithm. 20. Write a Python program to implement the Greedy Best First Search algorithm.	
60 Hrs	

Course Designed by	Mrs. S. Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI3N1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Extra Departmental Course(EDC I) : Web Development Essentials	Semester:	III
					Credits:	2

Course Objectives

- Understand the fundamentals of HTML and webpage structure.
- Develop web pages using tables, lists, forms, links and multimedia.
- Apply styling techniques using inline and external CSS.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Explain HTML text formatting, lists and linking techniques.	PO1,PSO1
CO4	Design web pages using tables, forms, images and navigation link.	PO2,PO3,PO7,PSO1
CO5	Apply CSS and multimedia elements in web development.	PO2,PO7,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	2	3	2	1	—	—	2	—	1	2	—	—	—	—	2	3	1
CO4	2	3	3	2	—	1	3	—	1	2	1	1	—	—	2	3	2
CO5	2	3	2	2	1	1	3	—	1	2	2	1	1	1	2	3	2

Contents

Internet concepts

1. Write a HTML Program for Text Formatting
2. Write a HTML Program to display your education details in a tabular format
3. Write a HTML Program to illustrate the usage of the following: a) Ordered List
b)Unordered List Definition List
4. Write a HTML code to create a Home page having three links: About Us, Our Services andContact Us. Create separate web pages for the three links.
5. Write a HTML Program to create a login form. On submitting the form, the user should getnavigated to a profile page
6. Write a HTML Program to demonstrate the Anchor Tag
7. Write a HTML Program to demonstrate inline image
8. Write a program to demonstrate inline CSS
9. Write a HTML program to demonstrate the usage of external CSS
10. Write a HTML program to demonstrate the embedding of sound and video files

Total	30
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Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Course Designed by	Mrs. S. Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI3N2			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Extra Departmental Course(EDC I) : Advanced Excel Lab	Semester:	III	
					Credits:	2	

Course Objectives

- To introduce the fundamentals of Microsoft Excel, including worksheet creation, formulas, and built-in functions.
- To develop skills in data organization, sorting, filtering, querying, and consolidation for effective data analysis.
- To enable learners to analyze and visualize data using subtotals, pivot tables, pivot charts, and graphical representations.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO2	Apply spreadsheet formulas and basic Excel functions such as SUM, AVERAGE, COUNT, MIN, and MAX to perform data calculations.	PO1,PO6,PO7,PSO1
CO3	Analyze and organize datasets using sorting, filtering, subtotal, and query tools in Excel.	PO1, PO3,PO6,PO7,PSO1
CO4	Design data summaries and visual representations using Pivot Tables, Pivot Charts, and various chart formats in Excel.	PO3,PO6,PO7, PO10,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO2	3	2	2	1	-	3	3	-	-	1	1	-	-	1	2	3	2
CO3	3	2	3	2	-	3	3	1	-	1	1	1	-	1	2	3	2
CO4	2	2	3	2	1	3	3	1	1	3	2	2	1	2	2	3	3

Contents	
1. Create Excel Sheets with Formula and Functions	
2. Create Excel Sheet and perform Sorting and Querying Data	
3. Create Excel sheet Using basic functions in Excel – Average, Count, Minimum , Maximum	
4. Create Excel sheet and use - Sum, Sumif, Count and Count if functions	
5. Create a sheet containing Nation-wide sales results for Avon Helmets-Region, Vendor name, Helmet type, Helmet Color and Total sales.	
a. Sort the data by Region, Vendor name and sales.	
b. Sort the data according to a custom list of Helmet Color - Red, Blue, Yellow and Green.	
6. Use Filtering on Region and Helmet type.	
7. Use subtotal function to count the number of records and sum of sales for the filtered records.	
8. Use Query Wizard to filter East, West Region transaction and sort them on Region and Total sales.	
9. Perform the following in the created Excel sheet	
a. Create a list of vendor and total sales by consolidating the total sales.	
b. Compute sub totals with no detail data.	
c. Create Subtotals by both Region and Vendor within Region.	
10. Create a PIVOT TABLE to show the sales results by Region and Helmet type and summarize the total sales.	
11. Create a PIVOT chart for the pivot table of total sales for the Region and Helmet types.	
12. Create a bar chart to show the sales results for different Helmet type and to the following formats.	
a. Add a Secondary axis.	
b. Create picture markers.	
Total	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Greg Harvey	Excel 2024/2026 All-in-One For Dummies	1 st Edition, John Wiley & Sons, Hoboken	2025

2	Wayne Winston	Microsoft Excel: Data Analysis & Business Modeling	7 th Edition,Microsoft Press, Redmond	2023
3	Joan Lambert	Microsoft Excel Step by Step (Office 2024/365)	1 st Edition,Pearson Education, London	2025

Reference Books

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Manish Sharma	Advanced Excel for Data Analysis	1 st Edition, BPB Publications, New Delhi	2024
2	Bill Jelen (MrExcel)	Excel Pivot Table Data Crunching	3 rd Edition,Pearson , Indianapolis	2024
3	Alexander &Kusleika	Excel 2026 Formulas and Functions	1 st Edition, Wiley, Indianapolis	2026

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

SEMESTER IV

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	26UAI411			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core VII: Machine Learning Techniques	Semester:	IV
					Credits:	3

Course Objective

- To understand core machine learning paradigms and algorithms.
- To implement supervised and unsupervised learning techniques.
- To explore neural networks and modern ML technologies.
- To develop practical skills using ML frameworks.
- To connect Machine Learning concepts with Indian Knowledge Systems (IKS).

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand ML fundamentals and mathematical foundations.	PO1
CO2	Implement regression and classification models.	PO1-PO3, PO5-PO7, PSO1
CO3	Apply clustering and Association rule mining techniques.	PO2, PO3, PO5, PO6, PSO1
CO4	Apply the algorithms to a real-world problem and optimize the models learned.	PO1, PO3-PO6, PSO1, PSO2
CO5	Appreciate the relevance of Indian Knowledge Systems in data-driven thinking and intelligent systems.	PO9, PO14, PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PO13	PO14	PO15	PSO 1	PSO 2
CO1	3	1	2	2	1	2	1	–	1	1	–	–	–	1	1	2	1
CO2	3	3	3	2	3	3	3	1	1	2	1	1	–	1	2	3	2
CO3	2	3	3	2	3	3	2	1	1	2	1	1	–	1	2	3	2
CO4	3	2	3	3	3	3	2	2	2	2	2	2	1	2	2	3	3
CO5	1	1	2	1	1	2	1	2	3	2	2	1	2	3	2	2	3

Unit	Course contents	Hours
I	Introduction: Machine Learning Foundations – Overview- AI vs ML vs Deep Learning – Design of a Learning System –ML Pipe line -MLLife cycle - Types of Machine Learning –Supervised Learning and Unsupervised Learning – Semi Supervised Learning- Reinforcement Learning - Data preprocessing and Feature Engineering - Model evaluation metrics (Accuracy, Precision, Recall, F1-score, ROC) - Overfitting & Underfitting- Bias–Variance Tradeoff- Applications of Machine Learning - Overview of Tools for ML.	12
II	Supervised Learning – Working of Supervised Learning – Steps involved in Supervised Learning – Regression Analysis in ML- Supervised Learning – I: Linear Regression - Simple Linear Regression – Multiple Linear Regression – Polynomial Regression – Ridge Regression – LassoRegression - Implementation of Regression algorithms in Python – Evaluating Regression Models – Model Selection – Ensemble Methods - Bagging, Boosting, Stacking - comparison	12
III	Supervised Learning – II: Classification – Logistic Regression – implementation of Logistic Regression in Python – K-Nearest Neighbour Decision – Implementation of KNN in Python – Decision tree Classification and Python implementation – Random Forest Classification and Python Implementation – Support Vector Machine - Implementation of SVM using Python– Evaluating Classification Models.	12
IV	Unsupervised Learning: Working of Unsupervised Learning-Types of Unsupervised Learning algorithms - Clustering – K-Means Clustering – Types of Clustering methods – K-Means Clustering Algorithm and Implementation in Python - Density-Based Clustering – DB Scan Algorithm in Python- Feature Selection Techniques - Dimensionality Reduction techniques– Collaborative Filtering - Types of Collaborative filtering - Applications -Anomaly Detection	12
V	Association Rule Learning: Working of Association Rule Learning- Types of AL – Concepts related to ARL – ARL Algorithms – Apriori Algorithm and implementation in Python – Eclat – Concepts and Algorithm. IKS with ML - Applications of ML in Indian languages and cultural datasets - AI for Ayurveda-based predictive diagnostics.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

TEXT BOOKS

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das	Machine Learning	Pearson India	2018
2	Kevin P. Murphy	Machine Learning: A Probabilistic Perspective	MIT Press	2012

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Michael W. Berry et al.	Supervised and Unsupervised Learning for Data Science	Springer	2020
2	Tom Mitchell	Machine Learning	McGraw-Hill, 1997	1997
3	Sebastian Raschka, VahidMirjilili	Python Machine Learning and deep learning”,	kindle book,2nd edition	2018
4	Carol Quadros	Machine Learning with Python, Scikit- learnandTensorflow”,	Packet Publishing,	2018

Web References

<https://www.geeksforgeeks.org/machine-learning/machine-learning/>
<https://realpython.com/tutorials/machine-learning/>
<https://www.tpointtech.com/machine-learning>
<https://www.kaggle.com/learn/intro-to-machine-learning>
<https://www.mygreatlearning.com/blog/machine-learning-tutorial/>
<https://machinelearningmastery.com/start-here/>

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI412			Title	Batch:	2026 – 2029	
Lecture Hrs./Week or Practical rs./Week	4	Tutorial Hrs./Sem.	60	Core VIII: Database System Concepts	Semester:	III	
					Credits:	3	

Course Objectives

- Introduce fundamental concepts of database systems and data modeling.
- Enable students to design, create, and manipulate relational databases using SQL.
- Develop understanding of database architecture, storage, and transaction management.
- Apply database concepts in AI and Machine Learning–based applications.
- Integrate IKS principles such as systematic classification, knowledge organization, and ethical data handling with modern database systems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand database models and architecture.	PO1
CO2	Design ER diagrams and relational schemas.	PO1,PO3,PO4,PO6, PSO1
CO3	Apply SQL queries and normalization techniques.	PO1- PO3,PO6,PSO1
CO4	Analyze transaction management and concurrency control.	PO1,PO3,PO4,PSO1
CO5	Implement database solutions for real-world applications.	PO1- PO4,PO6,PO7,PO15,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	1	2	1	–	–	–	–	–	–	–	2	2	1
CO2	3	2	3	3	1	3	1	–	–	1	1	–	–	–	2	3	2
CO3	3	3	3	2	1	3	2	–	–	1	1	–	–	–	2	3	2
CO4	3	2	3	3	1	2	2	1	1	–	–	1	–	–	2	3	2
CO5	3	3	3	3	2	3	3	1	1	1	1	2	1	1	3	3	3

Units	Course contents	Hours
Unit I	Introduction: Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design- Object-Based and Semi structured Databases - Data Storage and Querying - Transaction Management – Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems. Relational model : Structure of Relational Databases - Fundamental Relational-Algebra Operations - Additional Relational-Algebra Operations - Extended Relational-Algebra Operations - Null Values - Modification of the Database	12
Unit II	SQL : Data Definition - Basic Structure of SQL Queries - Set Operations- Aggregate Functions- Null Values -Nested Subqueries - Complex Queries - Views - Modification of the Database - Joined Relations Advanced SQL: Data Types and Schemas - Integrity Constraints - Authorization – Embedded SQL - Dynamic SQL - Functions and Procedural Constructs- Recursive Queries- Advanced SQL Features	12
Unit III	Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - Constraints - Entity-Relationship Diagrams Relational Database Design: Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies - More Normal Forms - Database-Design Process - Modeling Temporal Data. NoSQL definition: Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, Relational Vs non-relational database - Documents, collections working with NoSQL -CRUD operations - Running MongoDB – Indexing-Aggregation operations	12
Unit IV	ORACLE: Introduction – CODD’s Rule – Tools of ORACLE - Introduction to SQL – Benefits of SQL - Data Types – DDL – DML –DCL - TCL - Data Constraints. ORACLE SQL Functions –Single Row Functions: Date, Number, Miscellaneous, Conversions, Character Functions - Group Functions – SQL Operators: Arithmetic, Comparison and Logical Operators – Set Operators – Joins – Sub Queries – Views	11
Unit V	PL/SQL : Introduction–Advantages of PL/SQL – Architecture of PL/SQL – Introduction to PL/SQL Block - Data Types – Control Structures - Concepts of Error Handling – Cursor - Procedure - Functions – Triggers - Types of Triggers. Case study: Ayurveda Clinical Decision Support- including relational algebra, normalization, constraints, advanced SQL constructs, NoSQL databases, and database architecture, while effectively bridging modern DBMS technologies with traditional Indian knowledge domains.	13
Total		60

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ASilberschatz, H Korth, SSudarshan	Data base System and Concepts", (7th Edn.)	TMH.	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sadalage, P. & Fowler,	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence,	Pearson Education.	2012
2	Alexix Leon & Mathews Leon	"Essential of DBMS"	(2ndEdn.), Vijay Nicole Publications	2025
3	Alexix Leon & Mathews Leon	"Fundamentals of DBMS"	2ndEdn.), Vijay Nicole Publications	2019
4	Redmond, E. & Wilson	Seven Databases in Seven Weeks	Pragmatic Bookshelf	2018

Course Designed by	Dr. B. Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI4A1			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	GE IV – Allied IV: Computer Networks	Semester:	IV	
					Credits:	3	

Course Objective

- Understand the fundamentals of computer networks, protocols, and reference models.
- Analyze transmission media, routing, and transport mechanisms in network communication.
- Learn session, presentation, and application layer functionalities.
- Understand modern network services such as DNS, FTP, HTTP and email protocols.
- Apply traditional Indian Knowledge Systems (IKS) concepts in network communication and security models.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain network fundamentals, architectures, and OSI/TCP-IP mo	PO1,PSO1
CO2	Analyze physical and data link layer transmission techniques and protocols.	PO1,PO3,PSO1
CO3	Evaluate routing, addressing, congestion control and transport protocols.	PO1,PO3,PO4,PSO1
CO4	Describe session and presentation layer functions including encryption and compression.	PO9,PSO1
CO5	Apply application layer protocols and network security concepts with IKS perspectives such as Arthashastra cryptography and Guru–Shishya communication models.	PO3,PO7,PO9,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	2	–	–	1	–	1	1	–	–	–	–	2	3	1
CO2	3	2	3	2	–	1	2	–	1	1	–	–	–	–	2	3	1
CO3	3	2	3	3	1	1	2	1	1	1	1	1	–	–	2	3	2
CO4	2	1	2	2	–	–	1	–	3	1	–	–	–	–	2	3	2
CO5	2	2	3	2	1	2	3	1	3	2	1	1	1	1	2	3	2

Unit	Course Contents	Hours
I	Introduction: Uses of Computer Network-Network Hardware: LAN-WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI Reference Model– TCP/IP reference Model	12
II	Physical Layer - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. Data-Link Layer: Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols.	12
III	Network Layer: Routing algorithms – Congestion Control Algorithms – IPv4 Addresses – IPv6 Addresses. Transport Layer: Elements of Transport Protocols – Internet Transport Protocols: TCP – Quality of Service.	12
IV	Session Layer: Session and Transport Interaction – Synchronization Points– Session Protocol Data Unit. Presentation Layer: Translation – Encryption/Decryption – Authentication – Data Compression	12
V	Application Layer: DNS – E-mail: SMTP, POP– File Transfer Protocol– HTTP – Telnet Protocols. Network Security: Concepts of symmetric and asymmetric key cryptography. IKS Implementation with Application: Telnet allows users to access and control remote computers. Case Study: Remote Server Administration: Network administrator logs into a remote server - Executes commands remotely.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book(s)

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall	Computer Networks	6th Edition (Global Edition), Pearson	2021
2	James Kurose, Keith Ross	Computer Networking: A Top-Down Approach	8th Edition, Pearson	2021
3	Behrouz A. Forouzan	Data Communications and Networking with TCP/IP Protocol Suite	6th Edition, McGraw Hill	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Russ White and Ethan Banks	Computer Networking Problems and Solutions	Addison-Wesley Professional	2020
2	William Stallings	Network Security Essentials: Applications and Standards	7th Edition, Pearson	2022

Web References

<https://www.geeksforgeeks.org/basics-computer-networking/>

<https://www.javatpoint.com/computer-network-tutorial>

<https://ncert.nic.in/textbook/pdf/lecs110.pdf>

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI4A2			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	GE IV - Allied IV: Software Engineering	Semester:	IV	
					Credits:	3	

Course Objective

- Understand Software Engineering Fundamentals and SDLC
- Apply Requirement Engineering Techniques
- Design Scalable Software Systems.
- Ensure Software Quality through Testing and Maintenance
- Apply Software Project Management Practices.
- Integrate Indigenous Knowledge Systems (IKS) with Software Solutions.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand software engineering principles, SDLC models, and their relevance to AI/ML applications	PO1,PSO1
CO2	Analyze and document software requirements using SRS and requirement engineering techniques	PO3,PSO1
CO3	Design software systems using structured and object-oriented design principles with UML diagrams.	PO2,PO4,PSO1
CO4	Apply software testing methods, debugging techniques, and maintenance strategies to ensure quality.	PO2,PO3,PSO1
CO5	Apply project management principles including planning, estimation, risk, and version control in software development.	PO7,PO10,PO11,PO12,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	1	1	2	–	1	1	–	2	–	1	2	3	2
CO2	2	2	3	2	1	2	2	–	1	2	1	2	–	1	2	3	2
CO3	2	3	2	3	1	1	2	1	1	2	2	2	–	1	2	3	2
CO4	2	3	3	2	1	2	2	1	2	2	2	2	–	1	2	3	2
CO5	2	2	2	2	1	1	3	1	2	3	3	3	1	2	3	3	2

Unit	Course Contents	Hours
I	Introduction to Software Engineering: Introduction to Software Engineering - Software characteristics and software crisis - Software development life cycle (SDLC) . Process models: Waterfall model - Incremental model - Spiral model - Agile development model. Software tools and environments- Role of software engineering in AI and ML applications.	12
II	Software Requirements Engineering : Requirement engineering process - Requirement elicitation techniques - Functional and non-functional requirements - Software Requirement Specification (SRS) - Requirement validation and verification - Requirement management - Tools for requirement analysis - Case example: Requirement analysis for an AI-based recommendation system.	12
III	Software Design: Software design principles - Modular design and abstraction - Software architecture concepts - Structured design methods - Object-oriented design concepts. Introduction to Unified Modeling Language: Use case diagrams - Class diagrams - Sequence diagrams. Design for scalable AI-enabled software systems.	12
IV	Software Testing and Maintenance: Software testing fundamentals - Testing levels: Unit testing - Integration testing - System testing - Acceptance testing. Testing techniques: Black-box testing – White-box testing. Debugging and error tracking - Software quality assurance - Software maintenance types - Automated testing tools.	12
V	Software Project Management: Project planning and scheduling - Software cost estimation models - Risk management in software projects - Configuration management - Version control systems - Team management and collaboration in software projects. IKS Integration with Software Engineering Application: Digital Knowledge Management System. Case Study: Digital Preservation of Ancient Educational Resources.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book(s)

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Basit Shahzad	Modern Software Engineering: With AI Essentials	Amazon KDP / Academic Press	2025
2	Hitesh Mohapatra and Amiya Kumar Rath	Fundamentals of Software Engineering: Comprehensive Insights into SDLC and AI/ML	2nd Edition, BPB Publications / Perlego	2024
3	Rajib Mall	Fundamentals Of Software Engineering	PHI, 2nd edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Qinghua Lu, et al	Responsible AI: Best Practices for Creating Trustworthy AI Systems	Pearson Addison-Wesley	2023
2	Titus Winters, Tom Manshreck, and Hyrum Wright	Software Engineering at Google: Lessons Learned from Programming Over Time	O'Reilly Media	2020

Web References

<https://www.gacwrmd.in/learning/Computer/7MCE1E3-Software%20Engineering.pdf>
[https://soclibrary.futa.edu.ng/books/Fundamentals%20of%20Software%20Engineering,%20Fourth%20Edition,%20Rajib%20Mall%20\(%20PDFDrive%20\).pdf](https://soclibrary.futa.edu.ng/books/Fundamentals%20of%20Software%20Engineering,%20Fourth%20Edition,%20Rajib%20Mall%20(%20PDFDrive%20).pdf)
<https://www.computer.org/education/bodies-of-knowledge/software-engineering#evolving>

Course Designed by	Mrs. S. Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI413			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	CC Lab V: MACHINE LEARNING LAB	Semester:	IV	
					Credits:	2	

Course Objective

- Understand the use of statistical and mathematical libraries in machine learning.
- Implement supervised and unsupervised machine learning algorithms using Python.
- Apply machine learning techniques for prediction, classification, and clustering tasks.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Demonstrate the use of statistical and mathematical libraries for data analysis.	PO5,PO15,PSO1
CO4	Implement supervised learning algorithms such as regression, KNN, SVM, decision tree and random forest.	PO2,PO5,PO15,PSO1
CO5	Apply unsupervised learning techniques like K-means clustering and Apriori algorithm for pattern discovery.	PO2,PO5,PO15,PSO1

Mapping

CO/ PO/ PSO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO3	2	2	2	1	3	-	-	-	2	2	-	-	-	-	3	3	2
CO4	2	3	2	2	3	-	-	-	2	2	-	-	-	-	3	3	2
CO5	2	3	2	2	3	-	-	-	2	2	-	2	-	-	3	3	2

Content
1. Write a python program to demonstrate the statistical libraries 2. Write a python program to demonstrate the math libraries in machine learning 3. Write a python program to demonstrate simple linear regression 4. Write a python program to demonstrate the linear and polynomial using the machine learning 5. Write a program to using Linear Regression to predict continuous values like housing prices based on features. 6. Write a python program to demonstrate logistic regression using machine learning 7. Write a simple classification example using K-Nearest Neighbour. 8. Write a python program to demonstrate k- nearest neighbour algorithm using machine learning 9. Write a program that classifies iris flowers into different species based on petal and sepal measurements using K-nearest neighbor and Scikit-learn library. 10. Write a python program to demonstrate support vector machine using machine learning 11. Write a program for Basic decision tree classifier. 12. Write a python program to demonstrate random forest using machine learning 13. Write a python program to demonstrate the decision tree using machine learning 14. Write a python program to demonstrate the k-means clustering using machine learning 15. Write a python program to demonstrate the Apriori algorithm using machine learning

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI414			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	Title Core Lab VI : DBMS Lab	Semester:	IV	
					Credits:	2	

Course Objective

- Understand and implement SQL commands for database creation and manipulation.
- Develop PL/SQL programs using control structures and loops.
- Apply database concepts for secure data management and real-world problem solving.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Implement DDL, DML and DCL commands for database operations.	PO2,PO6,PO7,PSO1
CO4	Develop PL/SQL programs using conditional statements and looping constructs.	PO2,PO3,PO6,PO7,PSO1
CO5	Design database solutions using views, constraints and procedural logic.	PO1-PO3,PO6,PO7,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	2	3	2	1	—	3	3	—	1	1	1	—	—	—	2	3	2
CO4	2	3	3	2	—	3	3	1	—	1	1	—	—	—	2	3	2
CO5	3	3	3	2	1	3	3	1	1	1	1	1	—	—	2	3	3

Contents
1. To implement the DDL Commands. 2. Implementation of the DDL Commands with Key Constraints. 3. To Implement the DML Commands. 4. Implementation of DCL Commands and Views. 5. Write a PL/SQL program for decision making and control statements 6. Design a PL/SQL program for local and global variable 7. Design a PL/SQL program to implement cursor 8. Write a PL/SQL program to implement procedure 9. Write a PL/SQL program to implement function 10. Write a PL/SQL program to implement trigger 11. Write a MONGODB program for create, insert, update and delete operations 12. Write a MONGODB program for Filters 13. Write a MONGODB program for find commands 14. Write a MONGODB program for Aggregate functions
45Hrs

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI4S1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	SEC II : NaanMudhalvan: Advanced Java script Front end Framework with Angular	Semester:	IV
					Credits:	2

Course Objective

- Master Angular modules, components, dependency injection, and change detection.
- Implement complex routing strategies (lazy loading, guards) and manage state with NgRx.
- Build reusable components, custom directives, and pipes.
- Deep dive into reactive and template-driven forms with validation and dynamic forms.

Course Outcome

CO Number	CO Statement	PO Mapping
CO2	Create reusable components, directives, and services to enhance application modularity.	PO2,PO7,PSO1
CO3	Enhance application performance and security using best practices in AngularJS development and Integrate RESTful APIs and handle asynchronous data using AngularJS's	PO2,PO3,PO7,PSO1
CO4	Deploy and optimize AngularJS applications for real-world scenarios.	PO2,PO7,PO12,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO2	2	3	2	2	1	1	3	–	1	2	2	1	–	–	2	3	2
CO3	2	3	3	2	2	2	3	1	2	2	2	2	1	1	2	3	2
CO4	2	3	2	2	2	2	3	1	2	2	2	3	1	1	3	3	2

Content	Hrs
1. Program 1: Basic Angular Project Setup 2. Program 2: Create Angular Components with TypeScript 3. Program 3: Data Binding in Angular 4. Program 4: Working with Directives (ngIf, ngFor) 5. Program 5: Angular Service with Dependency Injection 6. Program 6: Fetching Data from APIs with Angular Service 7. Program 7: Implement Angular Routing for Multiple Pages 8. Program 8: Pass Parameters through Routes 9. Program 9: Reactive Forms for User Registration 10. Program 10: Template-driven Forms with Validation 11. Program 11: HTTP Client for Data Fetching 12. Program 12: Error Handling with HTTP Requests 13. Program 13: Lazy Loading in Angular Modules 14. Program 14: Sharing Services across Modules 15. Program 15: Using Angular Built-in Pipes 16. Program 16: Creating Custom Pipes in Angular 17. Program 17: Writing Unit Tests for Components 18. Program 18: Writing Unit Tests for Services 19. Program 19: Angular Performance Optimization 20. Program 20: Implement Angular Universal for SSR	
Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Adam Freeman	Pro Angular	Apress / 4th Edition	2022
2	Yakov Fain, Anton Moiseev	Angular Development with TypeScript	Manning / 3rd Edition	2022
3	Stephen Fluin, Minko Gechev	Learning Angular	O'Reilly / 3rd Edition	2023

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Clive Harber	Mastering JavaScript Functional Programming	Packt / 2nd Edition	2020

Online Resources/Web references

<https://www.geeksforgeeks.org/angularjs?>

<https://www.udemy.com/course/modern-web-development-from-zero-to-advanced?>

<https://www.guvi.in/angular-pack?>

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	BSc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)
CourseCode:	26UAI4S2			SEC II - Naan Mudhalvan: Aptitude using Vedic Mathematics	Batch: 2026-2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30		Semester: IV
					Credits: 2

Course Objective

- To enable the students to refine their mathematical, logical, and analytical skills.
- The student will be able to answer real-life simple problems by using HCF and LCM.
- The student is able to apply the correct sequence of operations to find out the value of a given mathematical expression.
- The student will be able to solve the problem involving square roots, cube roots, and average.
- To make them prepare for various public and private sector exams and placement drives.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	To have fundamental knowledge of Mathematics about problems of numbers using Mathematical formulae.	PO1,PO2
CO2	To understand the concepts of profit & loss related processing, simplification, etc.,	PO1,PO2,PO3
CO3	To apply the formulae to real time problems on probability, Areas of surfaces and apply data visualization tool for any data set.	PO1,PO2,PO3,PO4
CO4	To analyze the problems solving related to Age, Time and Distance and Time and Work etc. To examine their employability skills.	PO1,PO2,PO3,PO4,PO15
CO5	Use their logical thinking and analytical abilities to evaluate puzzle and decision making related questions from company specific and other competitive tests / To critically evaluate numerous possibilities related to puzzles. To develop their Competitive skills and improve the decision-making skills. To generate analytical reports and presentations using Data Interpretation.	PO1,PO2,PO3,PO4,PO5,PO15

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	2	—	—	—	—	—	1	—	—	—	—	2	2	1
CO2	3	1	2	2	—	1	—	—	—	1	—	—	—	—	2	2	1
CO3	3	2	2	2	1	2	2	1	—	2	1	—	—	1	2	3	2
CO4	3	2	3	3	—	1	—	—	—	1	1	—	—	—	2	3	2
CO5	2	2	3	3	—	2	1	1	1	3	2	1	1	1	3	3	2

Units	Content	Hrs
Unit I	Vedic Mathematics: Basic level: Miscellaneous - cube roots – square roots. Intermediate level: Base method for multiplication and squaring – digit sum method – simultaneous linear equations. Advanced level: Square roots of imperfect squares – cubing numbers – base method of division – practice problems.	6
Unit II	Mixtures or Allegations - Problems on Numbers - Problems on Ages –Percentage - Profits and Loss.	6
Unit III	Ratio and Proportion - Time and Work - Speed and Distance - Simple Interest - Compound Interest.	6
Unit IV	Permutation and Combination-Probability, Height and Distances-Boats and Streams-Odd Man Out &Series.	6
Unit V	Unit Digit Theory - Blood relations – Assumptions & Arguments – Statement & Conclusions – Directions.	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dhaval Bathia	Vedic Mathematics	Jaico Publishing company Ltd.	2022
2	R.S. Aggarwal	Quantitative Aptitude for Competitive Examinations	S.Chand & Company Ltd., New Delhi.	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Anita Sarla	Fundamentals & Applications of Vedic Mathematics	State council of education research & training.	2014
2	Praveen R.V	Quantitative Aptitude and Reasoning	PHI Learning Pvt. Ltd., New Delhi. 3 rd Edition.	2016
3	Rajesh Varma	Fast Track Objective Arithmetic	Arihant Publications India Limited, New Delhi	2018
4	Abhijit Guha	Quantitative Aptitude for	McGraw Hill Education	2020

		Competitive Examinations	(India) Private Limited. 7 th Edition	
5	Sarvesh K Verma	Quantitative Aptitude Quantum CAT	Arihant Publications India Limited, New Delhi; Twelve edition	2022

WebReferences

1. https://www.javatpoint.com/aptitude/quantitative
2. https://www.toppr.com/guides/quantitative-aptitude/
3. https://www.tutorialspoint.com/quantitative Aptitude/index.htm
4. https://www.sscadda.com/quantitative-aptitude/
5. https://prepinsta.com/learn-aptitude/
6. https://www.indiabix.com/
7. https://www.icai.org/post.html?post_id=17790
8. https://tnpsc.news/tnpsc-study-materials
9. http://www.kalvisolai.com/p/kalvisolai-tnpsc-study-materials.html
10. https://byjus.com/free-ias-prep/tnpsc-study-material/

Course Designed by	Dr.A.Albina		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI4N1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	Extra Departmental Course(EDC II) : Web Application Development	Semester:	IV
					Credits:	2

Course Objectives

- Understand PHP programming concepts and syntax for server-side scripting.
- Develop dynamic web applications using PHP for file handling, directory management, and data manipulation.
- Apply PHP for real-world applications such as table operations, form handling, and file operations.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Develop PHP programs for performing mathematical and string operations.	PO2,PSO1
CO4	Implement PHP scripts for file handling, directory operations, and execution control.	PO2,PO3,PO7,PSO1
CO5	Design dynamic web applications including database operations like insertion, deletion, and modification of records.	PO1-PO3,PO7,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	2	3	2	1	1	–	2	–	1	1	–	–	–	–	2	3	1
CO4	2	3	3	2	1	1	3	–	1	1	1	1	–	–	2	3	2
CO5	3	3	3	2	2	2	3	1	2	2	2	2	1	1	2	3	2

Content	
1. Write a PHP program which adds up columns and rows of given table 2. Write a PHP program to compute the sum of first n given prime numbers 3. Write a PHP program to find valid an email address 4. Write a PHP program to convert a number written in words to digit. 5. Write a PHP script to delay the program execution for the given number of seconds. 6. Write a PHP script, which changes the colour of the first character of a word 7. Write a PHP program to find multiplication table of a number. 8. Write a PHP program to calculate Factorial of a number. 9. Write a PHP script to read a file, reverse its contents, and write the result back to a new file 10. Write a PHP script to look through the current directory and rename all the files with extension .txt to extension .txt. 11. Write a PHP script to read the current directory and return a file list sorted by last modification time. (using filemtime()) 12. Write a PHP code to create a student mark sheet table. Insert, delete and modify records.	
Total	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI4N2			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Extra Departmental Course(EDC II) : Transforming Data with Excel and Power BI	Semester:	IV
					Credits:	2

Course Objectives

- Understand the fundamentals of data cleaning, transformation, and visualization using Excel and Power BI.
- Develop interactive reports and dashboards to analyze business and scientific data.
- Apply Power BI features such as Power Query, calculated columns, measures, and custom visuals for real-world scenarios.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Import and clean data from multiple sources using Excel and Power BI.	PO1,PO5,PO13
CO4	Transform data using Power Query operations such as filtering, splitting, merging, and grouping.	PO1,PO2,PO3,PO5,PO13
CO5	Create interactive visualizations, reports, and dashboards using Power BI tools.	PO3,PO5,PO11,PO13

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	2	2	2	1	1	3	3	–	1	1	–	–	–	–	2	3	2
CO4	2	3	3	2	2	3	3	–	1	1	1	1	–	–	2	3	2
CO5	2	3	3	2	2	3	3	1	1	3	2	1	1	1	2	3	2

Content	
1. Write a Power BI program to import data from different sources (CSV, text, web). 2. Write a Power BI program to Remove duplicates and handle missing data. 3. Write a Power BI program to import data from Excel, databases, and other sources. 4. Write a Power BI program to import Text to Columns operation to split data. 5. Write a Power BI program to use Find & Replace and Flash Fill for correcting data format. 6. Write a Power BI program to use Power Query to clean and transform data (e.g., filtering, renaming columns, and changing data types). 7. Write a Power BI program to Group data by categories and calculate aggregates (sum, average, count). 8. Write a Power BI program to Transform date and time data. 9. Write a Power BI program to create calculated columns and measures. 10. Write a Power BI program to create charts and graphs for data visualization. 11. Write a Power BI program to create basic reports and dashboards. 12. Write a Power BI program to use slicers and filters to create interactive reports. 13. Write a Power BI program to use Bookmarks and Selections for dynamic reports. 14. Write a Power BI program to implement custom visuals. 15. Write a Power BI program to combine multiple tables using Merge Queries in Power Query Editor.	
Total	30

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI4VA			Title	Batch:	2026 - 2029
				VAC-II : A	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem		Practical Approach for Predictive Analytics in Skill Development	Credits:	2

Course Objective

The objectives of this course are to have a practical understanding about Statistical technique using python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Apply Python statistical libraries to compute descriptive statistics such as measures of central tendency, variability, and summary statistics for datasets.	PO1,PO2,PO5,PSO1
CO4	Analyze relationships between variables using correlation measures and interpret statistical results using Python tools.	PO1-PO3,PO5,PSO1
CO5	Design and visualize data representations using plots such as histograms, box plots, pie charts, bar charts, heatmaps, and X–Y plots for effective data interpretation.	PO2,PO3,PO5-PO7,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	3	3	2	2	3	2	2	—	1	2	1	1	—	—	2	3	2
CO4	3	3	3	2	3	2	2	1	2	2	1	1	—	—	2	3	2
CO5	2	3	3	2	3	3	3	1	1	2	2	1	—	1	2	3	2

Units	Content	Hrs
Unit I	Introduction to Predictive Analytics and Python for Data Analysis :- Overview of Predictive Analytics in Skill Development- Introduction to Python Libraries: pandas, matplotlib, seaborn- Dataset Exploration and Cleaning- Visualizations for Skill Frequency and Demand Practical Programs: Load and display a skill dataset using pandas. Generate bar chart of top 10 most in-demand skills. Clean and preprocess missing data in skill CSV. Plot skill trends using line graphs over time.	10
Unit II	Supervised Learning for Skill Prediction - Data Preprocessing: Label Encoding, Normalization- Linear Regression for salary/skill-level prediction- Decision Tree and k-NN for job role classification- Evaluation: Accuracy, Confusion Matrix, MAE Practical Programs: Predict salary based on skill level using Linear Regression. Using Decision Tree to predict job role from skills. Apply k-NN to find matching job profiles. Evaluate classification model using confusion matrix	10
Unit III	Unsupervised Learning, Applications and Ethics – K Means Clustering for Skill Grouping- Cosine Similarity for Profile Matching- Bias and Fairness in AI Systems- Applications: Career Guidance, Learning Recommendations. Practical Programs: Cluster skill profiles using KMeans. Visualize clusters with matplotlib. Recommend similar candidates using cosine similarity. Detect anomalies in profiles using Isolation Forest	10
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Michael W. Berry et al.	Supervised and Unsupervised Learning for Data Science	Springer	2020
2	Sebastian Raschka, VahidMirjalili	Python Machine Learning and deep learning”,	kindle book, 2nd edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tom Mitchell	Machine Learning	McGraw-Hill, 1997	1997
2	Carol Quadros	Machine Learning with Python, Scikit- learn and TensorFlow”,	Packet Publishing,	2018

Web references

<https://www.tutorialspoint.com/python/index.htm>

<https://www.javatpoint.com/library-in-python>

<https://www.geeksforgeeks.org/libraries-in-python/>

<https://www.geeksforgeeks.org/descriptive-statistic/>

https://www.tutorialspoint.com/python_pandas/python_pandas_descriptive_statistics.htm

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

SEMESTER V

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI516			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC IX: Natural Language Processing	Semester:	V	
					Credits:	4	

Course Objective

- To be familiar with a breath of concepts and tasks in Natural Language Processing.
- To gain a foundational understanding about the methods and evaluation metrics for various NLP tasks.
- To understand the role of semantics of sentences and pragmatics

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	To tag a given text with basic Language features	PO1,PO7,PSO1
CO2	Understand the linguistic phenomena and to explore the linguistic features relevant to each NLP task.	PO1, PO3,PO6,PO7, PSO1
CO3	Analyze how to evaluate models generated from data.	PO1,PO3,PSO1,PSO2
CO4	Compare and contrast the use of different statistical approaches for different types of NLP applications	PO3, PSO2
CO5	Design an innovative application using NLP components.	PO5, PO7, PO8, PO10,PO13-PO15,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	1	2	3	1	1	2	1	1	1	1	2	3	2
CO2	3	2	3	2	1	3	3	2	1	2	2	1	2	2	2	3	2
CO3	3	1	3	2	2	3	2	2	2	2	2	1	1	2	2	3	3
CO4	2	1	3	2	2	2	2	2	2	2	2	1	1	2	2	2	3
CO5	2	2	2	2	3	2	3	3	2	3	2	2	3	3	3	3	3

Unit	Course contents	Hours
I	Overview - Definition and Scope of NLP - Origins and challenges of NLP – Phases of NLP - Language and Grammar-Processing Indian Languages-Components of NLP– NLP Pipeline –NLP Libraries – Natural Language Understanding and Generation – NLP Applications-Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.	15
II	Word Level Analysis - Regular Expressions - Finite-State Automata – Regular Expressions to NFA - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging. Syntactic Analysis – Concept of Parser – Types of Parsing – Parse Trees- Context free Grammar - Constituency- Parsing - Probabilistic Parsing.	15
III	Semantic Analysis- Meaning Representation-Approaches to Meaning Representation - Lexical Semantics– Elements of Semantic Analysis - Ambiguity- Word Sense Disambiguation – Applications of WSD - Discourse Processing – Building Hierarchical Discourse Structure - cohesion - Reference Resolution - Discourse Coherence and Structure.	15
IV	Natural Language Generation – Working of NLG – Stages of NLG- Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.	15
V	Information extraction– Key components of Information Extraction – IE Techniques - Automatic summarization-Python implementation - Information retrieval and Question answering-Named entity recognition and relation extraction – Steps involves in NER – Python implementation of NER – Python implementation of NER and Relation Extraction - IE using sequence labeling – Python Implementation -Machine translation: Basic issues in MT –Statistical translation – word alignment - phrase-based translation and synchronous grammars – Relationship between Phrase based Translation and Synchronous Grammars-Python implementation IKS with NLP - Application: Indian Language NLP - Named Entity Recognition for Indian names - Building a simple Sanskrit–English glossary system - Sentiment analysis on translated Indian philosophical texts - Case Study: Sanskrit Text Processing - Case Study based on verses from the Bhagavad Gita	15
Total		75

TEXT BOOK

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Hobson Lane & Maria Dyshel	Natural Language Processing in Action	Manning Publications 2 nd edition	2025
2	Daniel Jurafsky & James H. Martin	Speech and Language Processing	Pearson / Online 3 rd edition	2026
3	TanveerSiddiqui, U.S. Tiwary,	Natural Language Processing and Information Retrieval	Oxford University Press	2012

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Daniel Jurafsky and James H. Martin	Speech and Language Processing: An Introduction to Natural Language Processing	3e Prentice Hall	2026
2	Christopher Manning and HinrichSchütze	Foundations of Statistical Natural Language Processing	MIT Press,	2008.
3	James Allen	Natural Language Understanding	Addison Wesley.	1995
4	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI517			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem .	75	CC X:Big Data Technologies	Semester:	V	
					Credits:	4	

Course Objective

- Introduce the fundamentals of Big Data concepts, architecture, and technologies.
- Provide hands-on knowledge of Big Data processing frameworks and tools.
- Enable students to analyze and visualize large datasets using R programming.
- Apply Big Data analytics techniques to AI and Machine Learning applications.
- IKS concepts such as indigenous data practices, ethical data use, and holistic analysis with modern Big Data technologies.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain Big Data characteristics, architectures, and processing models.	PO1,PO6,PO14,PSO1,PSO2
CO2	Use Big Data technologies and frameworks for data storage and processing.	PO1,PO2,PO5-PO7, PO13,PSO1,PSO2
CO3	Implement data analysis and visualization techniques using R programming	PO2, PO5,PO6,PO15,PSO1
CO4	Apply Big Data analytics for AI and Machine Learning problem domains.	PO1-PO3,PO5-PO8,PO13-PO15,PSO1,PSO2
CO5	Relate Indian Knowledge Systems (IKS) principles such as ethical data usage, sustainability, and holistic analysis to Big Data applications.	PO9, PO14, PO15, PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	2	3	2	2	2	2	2	-	2	3	2	3	3
CO2	3	3	2	2	3	3	3	2	2	2	2	-	3	2	2	3	3
CO3	2	3	2	1	3	3	2	2	2	2	2	-	2	2	3	3	2
CO4	3	3	3	2	3	3	3	3	2	2	2	2	3	3	3	3	3
CO5	2	2	2	-	2	2	2	2	3	2	2	-	2	3	3	2	3

Units	Content	Hrs
Unit I	Introduction To Big Data: Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools	15
Unit II	Mining Data Streams: Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream –Real time Analytics Platform (RTAP) Applications	15
Unit III	Advanced Analytics: Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis	15
Unit IV	Hadoop And Frameworks: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.	15
Unit V	Introducing R: Understanding features of R – Studying the popularity of R - Getting information about popular organizations that hold big data –Reason for using R and Hadoop together Case Study: walmart - uber – Netflix – eBay -Procter and Gamble – Travel and Tourism – Telcom Industry. The Big Data and R programming framework can also be applied to an AI-driven Indian Knowledge Systems (IKS) case study focused on agricultural intelligence derived from traditional practices documented in texts such as the Krishi-Parashara- integrating Big Data technologies, machine learning, and R programming to modernize sustainable agriculture while leveraging indigenous knowledge systems.	15
	Total Contact Hrs	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Maheswari	DataAnalytics	McGraw Hill, 2 ndt Edition	2023
2	VigneshPrajapathi,	Big Data Analytics with R and Hadoop,	PACKT Publishing,	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Stephan Kudyba	Big Data, Mining, and Analytics: Components of Strategic Decision Making	Auerbach Publications	2014
2	Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author),	Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses	Wiley Publications, 2	2013
3	Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman,(2013)	Big Data for Dummies	First Edition, AWiley Publication	2013

Web References

<https://www.javatpoint.com/big-data-technologies>

https://www.tutorialspoint.com/big_data_analytics/index.htm

<https://www.javatpoint.com/hadoop-tutorial>

Course Designed by	Dr. B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI5E1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem .	75	DSE -I: IOT	Semester:	V
					Credits:	4

Course Objective

- To introduce the basic concepts, components, trends, and governance issues of the Internet of Things.
- To develop understanding of IoT protocols, architectures, and Web of Things standards for secure and interoperable systems.
- To enable learners to apply IoT concepts to industrial and societal applications, integrating Indian Knowledge Systems (IKS) for sustainable and responsible use.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain IoT ecosystem and importance.	PO1,PSO1
CO2	Analyze IoT protocols and communication standards.	PO1,PO3, PO7, PSO1
CO3	Apply IoT architecture and open-source platforms.	PO1,PO2,PO3,PO7, PSO1
CO4	Differentiate IoT and Web of Things for applications.	PO1 – PO4,PSO1
CO5	Develop IoT-based solutions integrating traditional sustainability concepts.	PO1,PO4,PO6,PO7,PO14, PO15,PSO1, PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	1	1	2	-	-	1	1	-	-	1	2	3	2
CO2	3	2	3	2	1	2	3	1	-	1	1	1	-	1	2	3	2
CO3	3	3	2	3	2	2	3	1	-	1	1	1	-	1	2	3	2
CO4	2	2	2	2	1	2	2	1	1	2	2	1	-	2	2	3	2
CO5	3	3	3	3	2	3	3	2	2	2	2	2	1	3	3	3	3

Units	Content	Hrs
Unit I	IOT: What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	15
Unit II	IOT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4– BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security	14
Unit III	IOT ARCHITECTURE: IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	15
Unit IV	WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence	16
Unit V	IOT APPLICATIONS: IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc, IoT-based Smart Agriculture System inspired by traditional Indian farming. Case Study :Smart Farming Inspired by Traditional Indian Practices Ancient farmers relied on: Rainfall patterns -Soil texture -Seasonal cycles	15
	Total Contact Hrs	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Simone Cirani, et al.	Internet of Things: Architectures, Protocols and Standards	1 st Edition, John Wiley & Sons, New Jersey	2024
2	Dilip Kumar & K.R. Venugopal	Internet of Things: Architectures, Protocols, and Applications	1 st Edition, McGraw Hill Education (India)	2026
3	Raj Kamal	Internet of Things: Architecture and Design Principles	2 nd Edition, McGraw Hill Education, Noida	2023

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga, Vijay Madisetti,	Internet of Things – A hands-on approach,	Universities Press 1 st Edition	2015
2	Jan Höller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand, David Boyle	From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence	Elsevier, 2 nd Edition	2018

Web references

<https://www.youtube.com/watch?v=4FxU-xpuCww>

<https://www.youtube.com/watch?v=C3tkJ96BzM0>

<https://www.youtube.com/watch?v=-syfaKGpiG8>

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI5E2			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE-I : Soft Computing	Semester:	V	
					Credits:	5	

Course Objective

- Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.
- Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain fundamental concepts of neural networks, fuzzy logic, and genetic algorithms.	PO1,PO4,PO5,PO8,PO15,PSO1
CO2	Apply neural network models including perceptron and backpropagation for prediction problems.	PO1, PO2, PO4, PO5,PO7,PO8,PO15,PSO1
CO3	Design fuzzy inference systems and fuzzy controllers for decision-making under uncertainty.	PO1, PO3-PO5,PO8,PO15,PSO1
CO4	Implement genetic algorithms for optimization problems.	PO1, PO3-PO5,PO8,PO15,PSO1
CO5	Integrate soft computing techniques to solve real-world applications such as agricultural optimization.	PO1-PO5,PO7,PO8,PO13,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	3	3	2	2	3	2	2	2	-	2	2	3	3	2
CO2	3	3	2	3	3	2	3	3	2	2	2	-	2	2	3	3	2
CO3	3	2	3	3	3	2	2	3	2	2	2	-	2	2	3	3	2
CO4	3	2	3	3	3	2	2	3	2	2	2	-	2	2	3	3	2
CO5	3	3	3	3	3	2	3	3	2	2	2	-	3	2	3	3	2

Unit	Course contents	Hours
I	Neural Networks-1(Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.	15
II	Neural Networks-II (Back propagation networks): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications..	16
III	Fuzzy Logic-I (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.	14
IV	Fuzzy Logic –II (Fuzzy Membership, Rules): Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications &Defuzzificataions, Fuzzy Controller, Industrial applications.	15
V	Genetic Algorithm(GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications. Using Genetic Algorithms to optimize crop rotation patterns, Neural Networks to predict seasonal yield, and Fuzzy Logic to handle uncertain rainfall data demonstrates integration of ancient agricultural knowledge with intelligent computational models.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.Rajasekaran, G.A.Vijayalaksh miPai	Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications	PHI Learning Pvt. Ltd.	2017
2	N.P.Padhy, S.P.Simon	Soft Computing with MATLAB Programming	Oxford University Press	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.N.Sivanandam , S.N.Deepa,	Principles of Soft Computing	Wiley India Pvt. Ltd., 2nd Edition	2011
2	SimanHaykin	Neural Networks and Learning Machines	Prentice Hall of India	2010

Web References:

<https://www.geeksforgeeks.org/deep-learning/introduction-to-artificial-neural-networks/>

https://onlinecourses.nptel.ac.in/noc20_ge09/preview?utm_source=chatgpt.com

[https://victorzhou.com › blog › intro-to-neural-networks](https://victorzhou.com/blog/intro-to-neural-networks)

[https://www.tutorialspoint.com › artificial_neural_network](https://www.tutorialspoint.com/artificial_neural_network)

Course Designed by	Dr. B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI5E3			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE -I Mobile Application Development	Semester:	V	
					Credits:	5	

Course Objective

- Understand system requirements for mobile applications
- Generate suitable design using specific mobile development frameworks
- Generate mobile application design
- Implement the design using specific mobile development frameworks
- Deploy the mobile applications in marketplace for distribution

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain mobile application architecture	PO1,PO7,PSO1
CO2	Design user-centric mobile applications considering hardware	PO1-PO3,PO7,PO10,PSO1
CO3	Develop Android applications integrating UI components	PO1-PO3,PO7,PO10,PSO1
CO4	Develop iOS applications using Objective-C	PO1- PO3, PO7, PO10,PSO1
CO5	Design and deploy cross-platform mobile applications integrating cloud	PO1–PO3, PO7,PO10, PO13,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	-	2	3	2	2	2	2	2	2	2	2	3	2
CO2	3	3	3	2	-	2	3	2	2	3	2	2	2	2	2	3	2
CO3	3	3	3	2	2	2	3	2	2	3	2	2	2	2	2	3	2
CO4	3	3	3	2	2	2	3	2	2	3	2	2	2	2	2	3	2
CO5	3	3	3	2	2	2	3	2	2	3	2	2	3	2	2	3	2

Unit	Course contents	Hours
I	INTRODUCTION: Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications	16
II	BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – user interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.	14
III	ADVANCED DESIGN: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.	15
IV	TECHNOLOGY I – ANDROID: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.	16
V	TECHNOLOGY II – IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace. A mobile app based on traditional Indian agricultural wisdom integrates GPS for soil-based crop suggestions, cloud data for weather updates, and multimedia guidance to promote sustainable farming using modern Android and iOS technologies.	14
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jeff McWherter and Scott Gowell	Professional Mobile Application Development	Wrox	2012
2	Charlie Collins, Michael Galpin and Matthias Kappler	Android in Practice	DreamTech	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James Dovey and Ash Furrow,	Beginning Objective C	Apress 1st Edition	2013
2	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson,	Beginning iOS 6 Development: Exploring the iOS SDK	Apress, 7th Edition	2023

Web References

<https://www.geeksforgeeks.org/android/android-tutorial/>
<https://www.tutorialspoint.com/android/index.htm>
<https://www.codecademy.com/catalog/subject/mobile-development>

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI518			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC Lab VI: Programming Lab in NLP	Semester:	V	
					Credits:	2	

Course Objectives

- To introduce the fundamental concepts and techniques of natural language processing(NLP).
- To understand natural language processing and to learn how to apply basic algorithms in this field.
- To understand the semantics and pragmatics of languages for processing.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO3	To demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.	PO5 , PO15, PSO1,PSO2
CO4	To understand the syntax, semantics and pragmatics of various languages.	PO2, PO5,PO15,PSO1
CO5	To analyse natural language processing and to learn how to apply basic algorithms in this field.	PO2,PO5,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO3	2	2	2	1	3	-	-	-	2	2	-	-	-	-	3	3	2
CO4	2	3	2	2	3	-	-	-	2	2	-	-	-	-	3	3	2
CO5	2	3	2	2	3	-	-	-	2	2	-	2	-	-	3	3	2

Content
1. Write a program for Tokenization 2. Write a program for sentence Tokenization 3. Write a program for Implementing word similarity. 4. Write a program for Stop words removal 5. Write a program for stemming 6. Write a program for chunking 7. Write a program for stop words generation 8. Write a program for Lemmatization

9. Write a program for relation extraction 10. Write a program for POS tagging 11. Write a program for Word frequency count 12. Write a program related to word sense disambiguation. 13. Write a program for NER 14. Write a program for text classification 15. Write a Program for Implementing Lexical analyzer. 16. Write a program for Implementing Semantic Analyzer. 17. Write a program to Implement Sentiment Analysis. 18. Write a program for Auto summarization 19. Write a program for Question and Answering 20. Write a program for phrase based translation 21. Write a program for Regex functions
Total hrs 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Christopher Manning and Hinrich Schütze	Foundations of Statistical Natural Language Processing	MIT Press,	2008.

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI519			Title	Batch:	2026-2029
				CC Lab VII : Big Data Technologies Lab	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

- Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
- Understand different approaches for building HadoopMapReduce programs for real-time application
- Provide students a hands-on exposure to scientific programming using R.
- Provide wider knowledge to know about data structures in R and its types.

Course Outcome

- On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Appreciate and apply the R programming from a statistical perspective.	PO1,PO2,PO6,PO7,PO15,PSO1
CO4	Apply MapReduce programs to real time datasets	PO2,PO6,PO7,PO15,PSO1
CO5	Analyze the data sets using R programming capabilities.	PO1,PO2,PO6,PO7,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO3	3	3	2	2	2	3	3	2	2	2	2	-	2	2	3	3	2
CO4	2	3	2	2	2	3	3	2	2	2	2	-	2	2	3	3	2
CO5	3	3	2	2	2	3	3	2	2	2	2	-	2	2	3	3	2

Content	
Write a R program to get the following • Implement different data structures in R (Vectors, Lists, Data Frames) • Write a program to read a csv file and analyze the data in the file in R • Create a data set and do statistical analysis on the data using R. • Write R program to find Correlation and Covariance • Write R program for logistic and linear Regression Modeling • Write R program to build classification model using KNN algorithm • Write R program to build clustering model using K-mean algorithm • Write R program to build a chart like Histogram, bar chart, pie chart etc.. • Write R program to build time series modeling	
Total Hours	75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tom White	Hadoop: The Definitive Guide	Fourth Edition, O'reilly Media	2015
2	Dr. G. Sudhamathy & Dr.C. JothiVenkateswaran	R Programming An Approach to Data Analytics	MJP Publishers	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Glenn J. Myatt,	Making Sense of Data	John Wiley & Sons, 2 nd Edition	2014
2.	Pete Warden	Big Data Glossary	O'Reilly	2011

Course Designed by	Dr. B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI5S1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	SEC III : AI for Cyber Security	Semester:	V
					Credits:	2

Course Objective

- The need for cyber security and its related threats and attacks.
- The methods for secure communication in the cyber world.
- The best practices and regulations related to cyber security

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand the concepts of cybercrime	PO1
CO2	Interpret national and international cyber security strategies, policies, and legal frameworks	PO1, PO5, PO15, PSO1
CO3	Apply cyber crime investigation techniques including digital evidence handling and ethical procedures.	PO1, PO9, PO15, PSO1
CO4	Analyze digital forensic tools and system/network forensic techniques	PO1-PO3, PO5-PO7, PO9, PO15, PSO1
CO5	Apply the Cyber Crime and Digital Forensics concepts in real-time scenarios.	PO1-PO3, PO5-PO9, PO15, PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	1	2	2	2	2	3	2	2	-	1	2	3	3	2
CO2	3	2	2	1	2	2	2	2	3	2	2	-	1	2	3	3	2
CO3	3	3	3	2	3	3	3	2	3	2	2	-	1	2	3	3	2
CO4	3	3	3	2	3	3	3	3	3	2	2	-	1	2	3	3	2
CO5	3	3	3	2	3	3	3	3	3	2	2	-	1	2	3	3	2

Units	Content	Hrs
I	Basics of Cyber crime : Introduction - Cyber Threat – Definition of Cyber Crime – Classification – Current Threats and Trends – Diversity of Cyber Crime – Cyber Hate Crimes – Cyber Terrorism - Need for cyber security.	12
II	Responding to Cyber crime : Cyber Strategy – National Security Strategy – Cyber Security Strategy – Organized Crime Strategy – Cyber Crime Strategy - Policy Cyber Crime – International Response – National Cyber Security Structure – Strategic Policy Requirements – Police and Crime Commissioners.	11
III	Investigating Cyber crime : Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business - Cyber Crime Investigation Skills – Criminal Investigation – Code of Ethics – Evidence – Hi-Tech Investigations – Capturing and Analyzing Digital Evidence.	12
IV	Foundations of Digital Forensics : Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face-Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.	12
V	Case Studies : Latest Study Topics on Cyber Crime and Investigations - Recent Cyber Crime Cases – Recent Digital Forensics Cases – Bridging the Gaps in Cyber Crime Investigations between the Cyber security stake holders. IKS Integration Concept: cyber threat monitoring system. Case study: Spy networks gathered information.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Thomas Halt, Adam M. Bossler and Kathryn C. SeigfriedSpellar,	“Cybercrime and Digital Forensics: An Introduction”	Routledge Taylor and Francis Group, 3 rd Edition	2022
2	Nour Moustafa	Digital Forensics in the Era of Artificial Intelligence	1 st Edition, CRC Press	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	B.B. Gupta, et al.	Digital Forensics and Cyber Crime Investigation: Recent Advances	CRC Press	2004

Course Designed by	Ms.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI5S2			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	SEC III:	Semester:	V	
				Advanced Java script back end Framework (Node JS,Express JS)	Credits:	2	

Course Objective

- Understand the role of AngularJS in full-stack development and its interaction with backend technologies
- Handle asynchronous data fetching and real-time updates using Web Sockets and Firebase.
- Optimize backend performance and security by implementing best practices in API development.
- Deploy full-stack AngularJS applications on cloud platforms like AWS, Firebase, or Heroku.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Develop RESTful APIs using Express.js and integrate them with AngularJS applications.	PO1,PO2,PO4,PO5,PO7PO15,PSO1
CO2	Design and connect AngularJS applications with databases (MongoDB, MySQL, Firebase) for data storage and retrieval.	PO1,PO2,PO4-PO7,PO15,PSO1
CO3	Implement authentication and authorization using JWT and session-based authentication mechanisms.	PO1, PO2, PO4, PO5,PO7PO9,PO15,PSO1
CO4	Develop real-time web applications using WebSockets (Socket.io) and Firebase services.	PO1, PO2, PO4-PO7,PO15,PSO1
CO5	Deploy secure full-stack applications on cloud platforms like AWS, Firebase, or Heroku.	PO1,PO2, PO4-PO7,PO9, PO13, PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	3	2	3	3	2	3	2	2	2	2	-	2	2	3	3	2
CO2	3	3	2	3	3	3	3	2	2	2	2	-	2	2	3	3	2
CO3	3	3	2	3	3	2	3	2	3	2	2	-	2	2	3	3	2
CO4	3	3	2	3	3	3	3	2	2	2	2	-	2	2	3	3	2
CO5	3	3	2	3	3	3	3	2	3	2	2	-	3	2	3	3	2

Course contents	Hours
Program 1: Basic HTTP server using Node.js Program 2: Reading files using the fs module in Node.js Program 3: Creating an HTTP server that handles multiple routes Program 4: Using callbacks and promises in Node.js Program 5: Set up an Express.js app with basic routing Program 6: Render views using EJS (or Pug) in Express.js Program 7: Implement a custom middleware function in Express.js Program 8: Error handling middleware in Express.js Program 9: Create dynamic routes in Express.js Program 10: Handle form submissions with POST request in Express.js Program 11: Connect to Database for CRUD operations Program 12: Implement JSON-based API in Express Program 13: JWT-based authentication in Express.js Program 14: Use Passport.js for session-based authentication Program 15: Secure Express app with helmet.js and cors Program 16: Input validation with express-validator Program 17: Unit tests for Express routes with Mocha and Chai Program 18: Mocking database calls in tests with Sinon.js Program 19: Deploy Express app to Heroku Program 20: Set up production-level logging in Express using Winston	12
60	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Adam Freeman	Pro Angular	Apress, 4th Edition	2022
2	Brad Green & Shyam Seshadri	AngularJS: Up and Running	O'Reilly, 1st Edition,	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Yakov Fain & Anton Moiseev	Angular Development with TypeScript	Manning, 3rd Edition	2022
2	Stephen Fluin & Minko Gechev	Learning Angular	O'Reilly, 3rd Edition	2023
3	Vishal Goyal & Anurag Mohnani	Full Stack Development with Angular and GraphQL	Packt, 1st Edition	2022
4	Clive Harber	Mastering JavaScript Functional Programming	Packt, 2nd Edition	2020

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI5S3			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	SEC III: Human Computer Interaction	Semester:	V
					Credits:	2

Course Objective

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain the foundations of HCI including human cognition, interaction models, ergonomics, and design paradigms.	PO1,PO3,PO9,PO10,PO15,PSO1
CO2	Apply interactive design principles, usability engineering, and prototyping techniques in software development.	PO1,PO2 , PO4, PO7, PO9,PO10,PO15,PSO1
CO3	Analyze HCI models, cognitive theories, and socio-organizational factors in system design.	PO1,PO3,PO8,PO9,PO15,PSO1
CO4	Design mobile interfaces considering mobile ecosystem, architecture, and usability principles.	PO1,PO2,PO4,PO7,PO9,PO10,PO15,PSO1
CO5	Evaluate web interface design patterns and interaction techniques using usability and universal design principles.	PO1,PO3,PO9,PO10,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	3	2	-	-	2	2	3	3	2	-	-	2	3	3	2
CO2	3	3	2	3	-	-	3	2	3	3	2	-	2	2	3	3	2
CO3	3	2	3	2	-	-	2	3	3	2	2	-	-	2	3	3	2
CO4	3	3	2	3	-	-	3	2	3	3	2	-	2	2	3	3	2
CO5	3	2	3	2	-	-	2	2	3	3	2	-	2	2	3	3	2

Unit	Course contents	Hours
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.	15
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.	15
III	MODELS AND THEORIES: HCI Models - Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.	15
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.	15
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale	Human Computer Interaction	3rd Edition, Pearson Education,	2004
2	Brian Fling	Mobile Design and Development	First Edition, O'Reilly Media Inc.,	2009
3	Bill Scott and Theresa Neil,	Designing Web Interfaces	First Edition, O'Reilly	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gerard Jounghyun Kim	Human-Computer Interaction: Fundamentals and Practice	CRC Press	2020
2	Biele, Cezary	Human Movements in Human-Computer Interaction(HCI),	Springer International Publishing	2022
3	. RohitRaja, ShilpaRani, ShrikantTiwari, Sandeep Kumar	Cognitive Behavior and Human Computer Interaction Based on Machine Learning Algorithms,	Addison Wesley.	2022

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI5AL			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem.		ALC I :Business Intelligence	Semester:	V
					Credits:	2

Course Objective

- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

Course Outcome

On the successful completion of the course, students will be able to

CO Number	Course Outcome Statement	PO Mapping
CO1	Explain the fundamentals of Business Intelligence, BI architecture, decision-making processes, and ethical considerations.	PO1,PO3,PO9,PO10,PO15,PSO1
CO2	Apply BI tools and knowledge delivery techniques such as reporting, dashboards, visualization, and dimensional analysis.	PO1,PO2,PO5-PO7,PO9,PO10,PO15,PSO1
CO3	Analyze efficiency models including CCR model, cross-efficiency analysis, clustering, and outlier detection techniques.	PO1,PO3,PO6, PO9,PO15,PSO1
CO4	Develop BI applications using marketing, logistic, and production models for business problem solving.	PO1,PO2,PO5-PO7,PO9,PO10,PO13,PO15,PSO1
CO5	Evaluate emerging BI technologies including Machine Learning, predictive analytics, text analytics, and advanced visualization techniques.	PO1,PO2,PO5-PO10, PO13, PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	3	2	2	2	2	2	3	3	2	2	2	2	3	3	2
CO2	3	3	2	2	3	3	3	2	3	3	2	2	2	2	3	3	2
CO3	3	2	3	2	2	3	2	2	3	2	2	2	2	2	3	3	2
CO4	3	3	2	2	3	3	3	2	3	3	2	2	3	2	3	3	2
CO5	3	3	2	2	3	3	3	3	3	3	2	2	3	2	3	3	2

Units	Content	Hrs
I	BUSINESS INTELLIGENCE: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.	
II	KNOWLEDGE DELIVERY: The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.	
III	EFFICIENCY: Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis	
IV	BUSINESS INTELLIGENCE APPLICATIONS: Marketing models – Logistic and Production models – Case studies.	
V	FUTURE OF BUSINESS INTELLIGENCE: Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Efraim Turban, Ramesh Sharda, DursunDelen,	Decision Support and Business Intelligence Systems	9th Edition,Pearson.	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Loshin Morgan, Kaufman	Business Intelligence: The Savvy Manager's Guide	Second Edition	2012
2	.Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Wiley Publications	2009
3	CindiHowson	Successful Business Intelligence: Secrets to Making BI a Killer App	McGraw- Hill	2007

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

SEMESTER VI

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI620			Title	Batch:	2026 - 2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./ Sem.	75	CC XI: Deep Learning	Semester:	VI	
					Credits:	3	

Course Objective

- To understand the mathematical and computational foundations of Deep Learning.
- To learn about feed forward neural networks, Convolutional neural networks, recurrent neural networks and attention mechanisms
- To design and implement deep neural network models.
- To explore real-world AI applications.
- To integrate principles from Indian Knowledge Systems (IKS) into AI and Deep Learning perspective

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Define fundamental concepts of Deep Learning including artificial neurons, activation functions, loss functions, gradient descent, CNNs, RNNs, LSTM, and Transformers.	PO1,PSO1
CO2	Understand the working principles of deep neural networks, backpropagation, convolution operations, sequence models, and optimization techniques.	PO1,PO3-PO6,PSO1
CO3	Apply deep learning models such as MLPs, CNNs, and RNNs using standard frameworks (TensorFlow/PyTorch) for classification and prediction tasks.	PO2-PO7,PSO1
CO4	Be able to design and implement deep neural network systems.	PO2-PO7,PSO1,PSO2
CO5	Evaluate deep learning solutions for real-world applications by considering model effectiveness, ethical implications, bias, sustainability, and integration of Indian Knowledge Systems (IKS) principles.	PO3-PO6, PO8, PO9, PO14,PO15,PSO1,PSO2

Mapping

CO/ PO/ PSO	P O1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO1	3	2	2	2	-	-	2	1	-	2	-	-	1	2	2	3	2
CO2	3	2	3	3	3	3	2	2	-	2	2	-	-	2	2	3	2
CO3	2	3	3	3	3	3	3	2	1	2	2	-	2	2	2	3	2
CO4	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	3	3
CO5	2	2	3	3	3	3	2	3	3	2	2	2	2	3	3	3	3

Units	Course Contents	Hrs
I	Introduction to Deep Learning –AI vs ML vs Deep Learning - History and evolution of Neural Networks- Biological neuron vs Artificial neuron - Perceptron model - Activation functions (Sigmoid, ReLU, Tanh, Softmax) - Applications of Deep Learning - The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural Networks – Types of Neurons – Softmax output layers.	15
II	Tensor flow – Introduction to TensorFlow – Core concepts - Components of TensorFlow - Use cases/ Applications of TensorFlow – Features of TensorFlow – Architecture of TensorFlow - Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – Visualization.	15
III	Convolution Neural Network –Fundamentals- convolution operations - Introduction to image processing - CNN Architectures - Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer –Applications.	15
IV	Recurrent Neural Network – Basic Components of RNN - Memory cells – sequence analysis – word2vec- LSTM & GRU - Memory augmented Neural Networks – NTM - Applications: Text Generation, Speech Recognition	16
V	Reinforcement Learning – MDP – Q Learning – IKS Perspectives – Applications - Deep Learning in Health care Case study- Deep Learning-Based Early Disease Prediction Model Inspired by Holistic Health Systems	14
	Total	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Charu C. Aggarwal	Neural Networks and Deep Learning	Springer Cham 2nd edition	2023
2	Ian Good fellow and YoshuaBengio and Aaron Courville	Deep Learning	MIT Press book	2016
3	Liangqu Long &Xiangming Zeng	Beginning Deep Learning with TensorFlow	Apress 1st Edition	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Amita Kapoor, Antonio Gulli, Sujit Pal	Deep Learning with TensorFlow and Keras	O'Reilly Media 3rdEdition	2022
2	Vinita Silaparasetty	Deep Learning Projects using TensorFlow 2	Apress Ist Edition	2020

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI6E4			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	DSE II: UI/UX Design	Semester:	VI
					Credits:	5

Course Objective

- Introduce fundamental principles of User Interface (UI) and User Experience (UX) design.
- Develop user-centered design thinking and usability evaluation skills.
- Enable students to design interactive interfaces using modern UI/UX tools and technologies.
- Apply UI/UX principles to AI-driven and intelligent systems.
- Integrate IKS concepts such as aesthetics, ergonomics, inclusivity, and ethical design with modern UI/UX practices.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand principles of user interface and user experience design.	PO1,PSO1
CO2	Analyze user requirements and usability factors.	PO7,PSO1
CO3	Design wireframes and prototypes.	PO7,PSO1
CO4	Evaluate usability testing and accessibility standards.	PO7,PO13,PSO1
CO5	Develop user-centric digital solutions	PO2,PO7,PO13,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	1	-	-	2	-	2	2	-	-	2	1	2	3	2
CO2	2	2	2	1	-	-	3	1	2	2	2	-	2	2	2	3	2
CO3	2	2	2	1	-	-	3	2	2	2	2	-	2	2	2	3	2
CO4	2	2	2	1	-	-	3	2	2	2	2	2	3	2	2	3	2
CO5	2	3	2	2	-	-	3	2	2	2	2	2	3	2	2	3	2

Unit	Course contents	Hours
I	Foundations Of Design: UI vs. UX Design – Core Stages of Design Thinking – Divergent and Convergent Thinking -Brainstorming and Game storming – Observational Empathy	12
II	Foundations of UI Design: Visual and UI Principles- UI Elements and Patterns – Interaction Behaviors and Principles –Branding- Style Guides	12
III	Foundations Of UX Design: Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals	12
IV	Wireframing, Prototyping And Testing: Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration	12
V	Research, Designing, Ideating, & Information Architecture: Identifying and Writing Problem Statements – Identifying Appropriate Research Methods – Creating Personas – Solution Ideation – Creating User Stories – Creating Scenarios – Flow Diagrams – Flow Mapping – Information Architecture Case Study : Vedic Mathematics Learning Interface presents an interactive digital learning system inspired by Vedic Mathematics to help students better understand step-wise mental calculation techniques.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joel Marsh,	UX for Beginners,	OReilly	2025
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product & Services	OReilly	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA , (3rd. ed.).	2023
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007 Third Edition.	2007

Course Designed by	Dr. B. Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6E5			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	DSE II: Gen AI	Semester:	VI	
					Credits:	5	

Course Objective

- To learn the fundamental soft Neural Networks and the various types.
- To explore Generative AI models like GANs, VAEs, and Transformers.
- To analyze the limitations of traditional RNNs and LSTMs.
- To discuss current trends and future directions in Generative AI research

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand the evolution of AI and the significance of Deep Learning.	PO1, PSO1
CO2	Apply various Neural Network architectures for tasks like image recognition and sequence modeling.	PO1-PO7, PSO1
CO3	Analyze data preprocessing and training techniques for neural networks..	PO3-PO6, PSO1, PSO2
CO4	Design practical solutions using advanced neural networks for diverse applications	PO2-PO8, PSO1, PSO2
CO5	Create a application using DL	PO2, PO4, PO5, PO7, PO8, PO10, PO13-PO15, PSO1, POS2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO1	3	1	2	2	2	2	1	1	1	-	1	-	-	2	2	3	2
CO2	3	3	3	3	3	3	3	2	1	-	2	-	-	2	2	3	2
CO3	2	2	3	3	3	3	2	2	2	-	2	-	1	2	2	3	3
CO4	2	3	3	3	3	3	3	3	2	2	2	-	2	2	2	3	3
CO5	2	3	2	3	3	2	3	3	2	3	2	2	3	3	3	3	3

Unit	Course contents	Hours
I	Foundational Concepts: Introduction to Artificial Intelligence - Machine Learning Fundamentals - Deep Learning Basics - Python Programming for AI.	12
II	Generative AI Models: Generative Adversarial Networks (GANs) - Variational Autoencoders (VAEs) - Transformers and Large Language Models (LLMs) – Auto encoders - Reinforcement Learning.	12
III	Hands-on Projects: Image Generation - Text Generation - Audio Generation - Application Development.	12
IV	Advanced Topics (Optional): Generative AI for Specific Domains - Medicine - Science - Art and Design - Ethical Considerations in Generative AI - Prompt Engineering.	12
V	Assessment: Quizzes and exams on theoretical concepts, Coding assignments and projects, and Final project presentation.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Altaf Rehmani	Generative AI for everyone: Understanding the essentials and applications of this breakthrough technology		2009
2	Numa Dhamani	Introduction to Generative AI	Kindle Edition	2024
3	Y Charu C. Aggarwal.	Neural Networks and Deep Learning: A Textbook		

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Josh Kalin	Generative Adversarial Networks Cookbook: Over 100 recipes to build generative models using Python, TensorFlow, and Keras	Packt Publishing	2018
2	Jesse Sprinter	Generative AI in Software Development: Beyond the Limitations of Traditional Coding		2024

Course Designed by	Dr. B. Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6E6			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	DSE –II:	Semester:	VI	
				Text Analytics	Credits:	5	

Course Objective

- To study the nature of text as a data source for knowledge discovery and identify its relevance to the information needs of diverse individuals, communities and organizations.
- To study some of the techniques by which text is automatically processed.
- To demonstrate the types of information which can be extracted from text, and the applications of these types.
- To examine the tools which support various types of text processing and analysis and apply them to address information needs, questions, and issues.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Describe the basics of text analytics	PO1,PSO1
CO2	Describe text analysis classification.	PO7,PSO1
CO3	Apply various text clustering techniques	PO7,PSO1
CO4	Explain n gram feature extraction and language models	PO7,PO13,PSO1
CO5	Interpret text data using visualization techniques	PO2,PO7,PO13,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	1	-	-	2	-	2	2	-	-	2	1	2	3	2
CO2	2	2	2	1	-	-	3	1	2	2	2	-	2	2	2	3	2
CO3	2	2	2	1	-	-	3	2	2	2	2	-	2	2	2	3	2
CO4	2	2	2	1	-	-	3	2	2	2	2	2	3	2	2	3	2
CO5	2	3	2	2	-	-	3	2	2	2	2	2	3	2	2	3	2

Unit	Course contents	Hours
I	An Introduction to Text Mining: Approaches to Text Analysis, Information Extraction from Text- Named Entity Recognition Rule-based Approach, Statistical Learning Approach. Relation Extraction -Feature-based Classification, Kernel Methods, Weakly Supervised Learning Methods - Unsupervised Information Extraction -Relation Discovery and Template Induction, Open Information Extraction. Basic text processing-tokenization, Stop word removal, Stemming and lemmatization, Language Models and Text Statistics.	12
II	Text Summarization Techniques: Topic Representation Approaches -Influence of Context Indicator Representations and Machine Learning for Summarization- Graph Methods for Sentence Importance Selecting Summary Sentences- Greedy Approaches: Maximal Marginal Relevance, Global Summary Selection	12
III	Classification for Text Analysis: Text Classification -Identifying Classification problems , Classifier Models ,Building a Text Classification Application -Cross-Validation , Model Construction ,Model Evaluation ,Model Operationalization Clustering for Text SimilarityUnsupervised Learning on Text -Clustering by Document Similarity- Distance Metrics , Partitive Clustering , Hierarchical Clustering -Modeling Document -Latent Dirichlet Allocation , Latent Semantic Analysis ,Non-Negative Matrix Factorization.	12
IV	Context-Aware Text Analysis: Grammar Based Feature Extraction - Context-Free Grammars , Syntactic Parsers ,Extracting Key phrases - Extracting Entities- n-Gram Feature Extraction , An n-Gram-Awar-Choosing the Right n-Gram Window- n-Gram Language Models - Frequency and Conditional Frequency ,Estimating Maximum Likelihood Text Visualization.-Visualizing Feature Space - Visual Feature Analysis , Guided Feature Engineering - Model Diagnostics - Visualizing Clusters ,Visualizing Classes ,Diagnosing Classification Error , Visual Steering - Silhouette Scores and Elbow Curves.	12
V	Graph Analysis of Text: Graph Computation and Analysis, Creating a Graph-Based Thesaurus ,Analyzing Graph Structure, Visual Analysis of Graphs , Extracting Graphs from Text - Creating a Social Graph. Entity Resolution -Entity Resolution on a Graph, Blocking with Structure, Fuzzy Blocking Cluster Computing with Spark- Sentiment Analysis- Deep Structure Analysis.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bilbro, Rebecca, Tony Ojeda, and Benjamin Bengfort.	Applied text analysis with Python	O'Reilly	2019
2	Aggarwal, Charu C., and ChengXiangZhai	Mining Text Data	Springer Publications Kindle Edition	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ignatow, Gabe, and RadaMihalcea.	An introduction to text mining: Research design, data collection, and analysis.	Sage Publications	2017
2	Struhl, Steven.	Practical text analytics: Interpreting text and unstructured data for business intelligence.	Kogan Page Publishers.	2015

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI6E7			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE- III : AR/VR	Semester:	VI
					Credits:	5

Course Objective

- To introduce the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socioeconomic impact and issues
- To understand virtual reality, augmented reality and using them to build Biomedical engineering applications
- To know the intricacies of these platform to develop PDA applications with better optimality

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Under the concept of realistic engineering	PO3,PSO1
CO2	Analyse& Design a system or process to meet given specifications with realistic engineering constraints.	PO2-PO4, PO15,PSO1
CO3	Identify problem statements and function as a member of an engineering design team	PO3,PSO1
CO4	Utilize technical resources	PO2-PO4,PO7,PO15,PSO1
CO5	Propose technical documents and give technical oral presentations related to design mini project results.	PO2,PO3,PO5,PO7,PO10,PO11,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	1	2	3	2	-	-	2	-	-	2	-	-	-	-	2	3	-
CO2	2	3	3	3	-	-	2	-	-	2	2	2	1	-	3	3	2
CO3	-	2	3	2	-	-	2	-	-	2	2	1	-	-	2	3	-
CO4	2	3	3	3	2	2	3	2	-	2	2	2	2	2	3	3	2
CO5	2	3	3	2	3	2	3	2	2	3	3	2	2	2	3	3	2

Unit	Course contents	Hours
I	INTRODUCTION :The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.	15
II	VR DEVELOPMENT PROCESS :Geometric modeling - kinematics modeling- physical modeling - behaviour modeling – model Management.	15
III	CONTENT CREATION CONSIDERATIONS FOR VR :Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness - side effects of exposures to virtual reality environment	15
IV	VR ON THE WEB & VR ON THE MOBILE 9 JS-pros and cons-building blocks (WebVR, WebGL, Three.js, device orientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics	15
V	APPLICATIONS medical applications-military applications-robotics applications- Advanced Real time Tracking other applications- games, movies, simulations, therapy.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jos Dirksen, Packt	The JavaScript 3D Library for WebGL	Packt Publishing, 2 ND Edition	2015
2	Jason Jerald	The VR Book: Human - Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool	Association for Computing Machinery & Morgan & Claypool Publishers	2015

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joerg Osarek,	Virtual Reality Analytics	Gordon's Arcade	2016
2	Dieter Schmalstieg & Tobias Hollerer	Augmented Reality: Principles and Practice (Usability)	Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States,	2016. ISBN: 9780321883575
3	Steve Aukstakalnis, Addison-Wesley Professional	Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability)	Addison-Wesley Professional (Pearson Education)	2016

Course Designed by	Dr. B. Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6E8			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE- III Open Source Technologies	Semester:	VI	
					Credits:	5	

Course Objective

- To provide a basic idea of Open source technology and the software development process to understand the role and future of open source software in the industry
- Analyzing the impact of legal, economic and social issues of Open Source software
- Understand the policies, licensing procedures and ethics of FOSS.
- Awareness with Open-Source Technologies.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Differentiate between Open Source and Proprietary software and Licensing.	PO1,PSO1
CO2	Recognize the applications, benefits and features of Open-Source Technologies	PO7,PSO1
CO3	Analyze Open Source Technology and to interpret, contrast and compare open source products among themselves	PO7,PSO1
CO4	Gain knowledge to start, manage open-source projects.	PO7,PO13,PSO1
CO5	Implement Open Source Projects	PO2,PO7,PO13,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	1	-	-	2	-	2	2	-	-	2	1	2	3	2
CO2	2	2	2	1	-	-	3	1	2	2	2	-	2	2	2	3	2
CO3	2	2	2	1	-	-	3	2	2	2	2	-	2	2	2	3	2
CO4	2	2	2	1	-	-	3	2	2	2	2	2	3	2	2	3	2
CO5	2	3	2	2	-	-	3	2	2	2	2	2	3	2	2	3	2

Unit	Course contents	Hours
I	Introduction: Why Open Source – Open Source –Principles, Standards Requirements, Successes – Free Software – FOSS – Internet Application Projects	15
II	Open source: Initiatives, Principles, Methodologies, Philosophy, Platform, Freedom, OSSD, Licenses – Copy right, Copy left, Patent, Zero Marginal Technologies, Income generation opportunities, Internalization	15
III	Case Studies: Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office.	15
IV	Open Source Project: Starting, Maintaining –Open Source – Hardware, Design, Teaching & Media	15
V	Open Source Ethics: Open Vs Closed Source – Government – Ethics – Impact of Open source Technology – Shared Software – Shared Source	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	KailashVadera, Bhavyesh Gandhi	Open Source Technology	Laxmi Publications Pvt Ltd, 1st Edition.	2012
2	Fadi P. Deek and James A. M. McHugh,	Open Source: Technology and Policy	Cambridge Universities Press	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Clay Shirky and Michael Cusumano	Perspectives on Free and Open-Source Software	MIT press.	2016
2	Andrew M. St. Laurent, O'Reilly Media	Understanding Open Source and Free Software Licensing	O'Reilly Media	2004
3	Dan Woods, GautamGuliani,	Open Source for the Enterprise	O'Reilly Media Inc.,	2005

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6E9			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE-III Robotics & its Applications	Semester:	VI	
					Credits:	5	

Course Objective

- To provide fundamental knowledge of robotics concepts, including robot classification, kinematics, actuators, sensors, and end effectors.
- To develop an understanding of robot motion planning, navigation, vision systems, and programming techniques used in industrial and autonomous robots.
- To expose students to real-world robotic applications and indigenous developments, including ISRO robotic systems and Make in India initiatives.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain robotic systems, classification and AI integration.	PO1,PSO1
CO2	Apply kinematic concepts using joints and D-H parameters	PO1, PO3,PO4,PSO1
CO3	Analyze actuators, sensors and end effectors.	PO1,PO3,PSO1
CO4	Apply path planning and vision system techniques.	PO1- ,PO4,PO7,PSO2
CO5	Develop basic robot programming solutions and relate to indigenous robotics.	PO1-PO4,PO7, PO15,PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	1	1	2	1	-	1	1	-	-	1	2	3	2
CO2	3	2	3	3	1	1	2	1	-	1	1	1	-	1	2	3	2
CO3	3	2	3	2	1	2	2	1	-	1	1	1	-	1	2	3	2
CO4	3	3	3	3	2	2	3	2	-	2	2	1	-	2	2	3	2
CO5	3	3	3	3	2	2	3	2	1	2	2	2	1	2	3	3	3

Unit	Course contents	Hours
I	Introduction, brief history, types, classification and usage, science and technology of robots, Artificial Intelligence in Robotics. Joints and Links: Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms.	15
II	Actuators and Sensors: Different kind of actuators, stepper-DC-servo- and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders-tachometers-strain gauge-based force torque sensor-proximity and distance measuring sensors-and vision	15
III	End Effectors: Classification of end effectors - Tools as end effectors- Drive system for grippers- Mechanical adhesive – Vacuum, Magnetic grippers- Hooks and Scoops- Gripper force analysis - Gripper design - Active and Passive grippers	15
IV	Planning and Navigation: Introduction - path planning - Overview - Road map path planning - Cell decomposition path planning - Potential field path planning - Obstacle avoidance. Vision system: Robotic vision systems - Image representation - Object recognition and categorization - Depth measurement- Image data compression-Visual inspection-Software considerations.	15
V	Robot Programming: Introduction to Robot Languages –VAL – RAPID language - Basic commands - Motion instructions - Pick and Place operation using industrial robot manual mode - Automatic mode - Subroutine command based programming - Move master command language – Introduction – Syntax - Simple problems. Use of robotic arms & planetary rovers in missions by Indian Space Research Organisation. Case studies: ISRO robotic arms and planetary rovers, Indigenous industrial robots under Make in India initiatives	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. K. Saha	Introduction to Robotics	3 rd Edition, McGraw Hill Education , Noida (India)	2024
2	Ashitava Ghosal	Robotics: Fundamental Concepts and Analysis	2 nd Edition, Oxford University Press, New Delhi	2023
3	John J. Craig	Introduction to Robotics: Mechanics and Control	4 th Edition, Pearson Education, Boston/Noida	2025
4	Mark W. Spong, Seth Hutchinson, & M. Vidyasagar	Robot Modeling and Control	2 nd Edition, Wiley India, New Delhi	2024

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Amit Kumar Tyagi	Industrial Robotics in Smart Manufacturing	1 st Edition, CRC Press / Routledge, , New York/Gujarat	2026
2	Alex Ellery	Planetary Rovers: Robotic Exploration of the Solar System	1 st Edition, Springer Praxis, UK/India	2024
3	Mikell P. Groover	Industrial Robotics: Technology, Programming, and Applications	2 nd Edition, McGraw Hill	2022 (Reprint), New

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI621			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	6	Tutorial Hrs./Sem.	90	CC Lab IX: Deep Learning Lab	Semester:	VI
					Credits:	2

Course Objectives

- To Build The Foundation Of Deep Learning.
- To Understand How To Build The Neural Network.
- To enable students to develop successful machine learning concepts.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Learn The Fundamental Principles Of Deep Learning.	PO5, PO7, PO15, PSO1
CO4	Identify The Deep Learning Algorithms For Various Types of Learning Tasks in various domains.	PO2, PO5, PO7, PO13, PO15, PSO1
CO5	Implement Deep Learning Algorithms And Solve Real-world problems.	PO2, PO5, PO7, PO8, PO13, PO15, PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PO13	PO14	PO15	PSO 1	PSO 2
CO3	2	2	2	1	3	2	3	2	2	2	2	-	2	2	3	3	2
CO4	2	3	2	2	3	2	3	2	2	2	2	-	3	2	3	3	2
CO5	2	3	2	2	3	2	3	3	2	2	2	2	3	2	3	3	2

Content
1. Setting up the Spyder IDE Environment and Executing a Python Program 2. Installing Keras, Tensorflow and Pytorch libraries and making use of them 3. Linear Regression with TensorFlow 4. Custom Training Loop 5. XOR problem with Neural Network 6. Higher Ranking Tensors 7. IRIS Dataset ANN 8. Scalar, Vector and Matrix Tensors 9. ANN Real Time Dataset 10. RNN 11. Binary classification using Feed Forward Neural Network

12. Over Fitting & Drop out 13. Implementing simple CNN 14. Image Classification on MNIST Dataset 15. Applying the Convolution Neural Network on computer vision problems 16. Image classification on MNIST dataset (CNN model with Fully connected layer) 17. Basic classification with TensorFlow 18. Linear Layer using PYTORCH 19. Soft-Max based Multiclass classification using Neural Nets 20. Multi Layer Perceptron
Total Hours 90

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Charu C. Aggarwal	Neural Networks and Deep Learning	Springer Cham 2nd edition	2023
2	Ian Good fellow and YoshuaBengio and Aaron Courville	Deep Learning	MIT Press book	2016
3	Liangqu Long &Xiangming Zeng	Beginning Deep Learning with TensorFlow	Apress 1st Edition	2022

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Amita Kapoor, Antonio Gulli, Sujit Pal	Deep Learning with TensorFlow and Keras	O'Reilly Media 3rdEdition	2022
2	Vinita Silaparasetty	Deep Learning Projects using TensorFlow 2	Apress Ist Edition	2020

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	26UAI622			Title	Batch:	2026-2029
				CC Lab X:UI/UX Lab	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

- Understand the core features and functionalities of UI/UX.
- Learn how to navigate the UI interface.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Build UI for user Applications	PO5,PO15,PSO1
CO4	Demonstrate UX Skills in product development	PO2,PO5,PO15,PSO1
CO5	Create Wireframe and Prototype	PO2,PO5,PO15,PSO1

Mapping

CO/PO/PSO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO3	2	2	2	1	3	-	-	-	2	2	-	-	-	-	3	3	2
CO4	2	3	2	2	3	-	-	-	2	2	-	-	-	-	3	3	2
CO5	2	3	2	2	3	-	-	-	2	2	-	2	-	-	3	3	2

Units	Content
	• Create a Figma account and explore the interface (tools, frames, layers, assets). • Design a simple mobile app login screen with username and password fields. • Create a signup/registration page UI with input forms and buttons. • Design a basic website homepage layout with header, navigation bar, and footer. • Create a mobile app dashboard UI with icons and menu options. • Design a product card component for an e-commerce app. • Create wireframes for a simple mobile application (3–4 screens). • Design a navigation menu or sidebar for a web application. • Create interactive prototypes by linking multiple screens. • Design a complete mobile app UI (login, home, profile, settings screens).
	Total Hours 75

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joel Marsh,	UX for Beginners,	OReilly	2022
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product & Services	OReilly	2021

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA, (3rd. ed.).	2023
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007Third Edition.	2007

Course Designed by	Dr.B.Azhagusundari		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI622			Title	Batch:	2026-2029
				CC Lab X: Data Visualization Lab	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

- Understand the core features and functionalities of Power BI.
- Learn how to navigate the Power BI interface, including Power BI Desktop and Power BI Service.
- Familiarize with Power BI components like reports, dashboards, and datasets.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Apply data importing, cleaning, and transformation techniques using Microsoft Power BI Desktop to prepare datasets from different sources such as CSV, Excel, text, web, and databases.	PO1,PO6,PO7,PSO1
CO4	Analyze and manipulate datasets by performing operations such as merging tables, pivoting/unpivoting data, transforming date-time values, and creating calculated columns and measures.	PO1,PO3,PO6,PO7,PSO1
CO5	Evaluate and design interactive business reports and dashboards using visualizations such as bar charts, pie charts, line charts, slicers, filters, drill-down features, and bookmarks for effective decision-making.	PO3,PO6,PO7,PO10,PSO1, PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PS O1	PS O2
CO3	3	2	2	1	-	3	3	-	-	1	1	-	-	1	2	3	2
CO4	3	2	3	2	-	3	3	1	-	1	1	1	-	1	2	3	2
CO5	2	2	3	2	1	3	3	1	1	3	2	2	1	2	2	3	3

Content

1. Import data from different sources (CSV, text, web).
2. Import data from Excel, databases, and other sources.
3. Combine multiple tables using Merge Queries in Power Query Editor.
4. Customer Segmentation Using Unpivot and Grouping Techniques

5. Transform date and time data. 6. Create calculated columns and measures. 7. Pivot and Unpivot data in Power Query. 8. Create Basic Business Report in Power Bi 9. Create a Simple Bar Chart for data visualization. 10. Create a Pie Chart for data visualization. 11. Create a Line Chart for data visualization. 12. Create a Donut Chart for data visualization. 13. Create a Donut Chartfor data visualization. 14. Create a Stacked Bar Chart for data visualization. 15. Create basic reports and dashboards. 16. create Market Analysis Using Slicers And Filters in Power Bi 17. Use Bookmarks and Selections for dynamic reports. 18. Create Interactive Sales Dashboards Using Drill-Down and Bookmarks 19. Create a multi-page dashboard with synced slicers and business visuals 20. Report publishing and sharing with business stakeholders
Total Hours 75

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Cole NussbaumerKnaflic	Storytelling with Data: A Data Visualization Guide	2 nd Edition, Wiley, New Jersey	2024
2	Robert Spence	Information Visualization: An Introduction	Third Edition, Pearson Education	2014
3	Colin Ware	Information Visualization Perception for Design	4th Edition, Morgan Kaufmann	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Matthew O.Ward, George Grinstein, Daniel Keim,	Interactive Data Visualization: Foundation, Techniques and Applications	Second Edition, A.K.Peters/CRC Press	2015
2	Will Thompson	Microsoft Power BI Data Analyst (PL-300)	2 nd Edition, Microsoft Press, Washington	2024
3	Ken Puls & Miguel Escobar	Master Your Data with Power Query	2 nd Edition, Holy Macro! Books, Canada/India	2024
4	Daniil Maslyuk	Power BI Step by Step	1 st Edition, Microsoft Press, London	2025

Course Designed by	Dr.S.Sridevi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI622			Title	Batch:	2026-2029
				CC Lab X:Text Analytics lab	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

- Understand the core features and functionalities of Text Analytics
- To implement machine learning algorithms for tasks like text classification and clustering
- To perform text preprocessing such as tokenization, stop word removal, stemming, and lemmatization to clean raw text data.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO3	Apply NLP preprocessing techniques to clean and prepare text data	PO5,PO15,PSO1
CO4	Implement NLP feature extraction methods like TF-IDF and Bag-of-Words	PO2,PO5,PO15,PSO1
CO5	Develop machine learning models for text classification and clustering	PO2,PO5,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO3	2	2	2	1	3	-	-	-	2	2	-	-	-	-	3	3	2
CO4	2	3	2	2	3	-	-	-	2	2	-	-	-	-	3	3	2
CO5	2	3	2	2	3	-	-	-	2	2	-	2	-	-	3	3	2

Content

Text Pre-processing: to clean text (lowercase conversion, remove punctuation, remove stop words).

Word and Character Count: number of words,number of characters,average word length.

Tokenization: Implement word tokenization and sentence tokenization for a given text dataset.

Stop Words Removal: Remove stop words from text using Python libraries like NLTK.

Stemming and Lemmatization: Perform stemming and lemmatization for a given set of words.

N-grams Generation: Generate **bi-grams** and **tri-grams** from a text corpus.
Term Frequency (TF): Calculate **term frequency** for words in a document.
Inverse Document Frequency (IDF): Compute **IDF** for a collection of documents.
TF-IDF Calculation: Implement **TF-IDF vectorization** for text documents.
Word Cloud Generation: create a **word cloud** from a text dataset.
Sentiment Analysis: Perform sentiment analysis on tweets or product reviews.
Text Vectorization: Convert text into vectors using **Bag-of-Words model**.
Topic Modeling: Implement topic modeling using **LDA (Latent Dirichlet Allocation)**.
Text Classification (Supervised): Classify text using a supervised model like Naive Bayes.
Text Clustering (Unsupervised): Group similar documents using K-Means clustering

Total Hours 75

Text Books

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bilbro, Rebecca, Tony Ojeda, and Benjamin Bengfort.	Applied text analysis with Python	O'Reilly	2019
2	Aggarwal, Charu C., and ChengXiangZhai	Mining Text Data	Springer Publications Kindle Edition	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ignatow, Gabe, and RadaMihalcea.	An introduction to text mining: Research design, data collection, and analysis.	Sage Publications	2017
2	Struhl, Steven.	Practical text analytics: Interpreting text and unstructured data for business intelligence.	Kogan Page Publishers.	2015

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI623			Title	Batch:	2026– 2029
				Project	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem.			Credits:	2

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	26UAI6S4			Title	Batch:	2026-2029
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	SEC IV: Social & Ethical Issues in AI	Semester:	VI
					Credits:	2

Course Objective

- To introduce students to ethical challenges in Machine Learning and Artificial Intelligence systems including bias, fairness, and accountability.
- To understand Artificial General Intelligence (AGI), superintelligence, and technological singularity from philosophical and ethical perspectives.
- To analyze ethical issues in algorithmic decision-making systems such as racist AI and automated governance.
- To examine ethical implications of autonomous systems, including autonomous weapons and self-driving vehicles.
- To explore moral theories and ethical frameworks that guide responsible AI design and deployment.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Explain ethical issues in machine learning algorithms, Artificial General Intelligence, super intelligence, and technological singularity.	PO1,PO15
CO2	Analyze algorithmic bias, racist AI, and ethical concerns in automated decision-making systems and evaluate accountability mechanisms.	PO2, PO6, PO8,PO15,PSO2
CO3	Evaluate ethical implications of autonomous systems such as autonomous weapons, robot warriors, and human oversight in AI warfare.	PO6, PO8, PO15,PSO2
CO4	Apply ethical theories such as consequentialism, deontology, virtue ethics, and moral agency to real-world AI problems including self-driving car dilemmas	PO4, PO8,PO15,PSO2
CO5	Assess future societal impacts of AI including workplace automation, human-AI enhancement, anthropomorphic bias, and friendly AI design.	PO2,PO3,PO6-PO8, PO10, PO12, PO15, PSO1,PSO2

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	P O4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	1	1	1	2	1	2	-	1	-	2	-	-	3	2	1
CO2	2	3	2	2	1	3	2	3	1	2	-	2	-	-	3	2	3
CO3	1	2	2	2	1	3	2	3	1	2	-	2	-	-	3	1	3
CO4	2	2	2	3	1	2	1	3	2	2	-	2	-	-	3	2	3
CO5	2	3	3	2	2	3	3	3	2	3	1	3	1	1	3	3	3

Unit	Course contents	Hours
I	Ethics in Machine learning and other domain-specific AI algorithms- Artificial general intelligence - machines with moral status - minds with exotic properties - super intelligence. Singularity - A philosophical Analysis: Argument for a singularity-Intelligence explosion without intelligence.	9
II	Orthogonality of motivation and intelligence-instrumental convergence. Racist AI: Rise of algorithmic decision making: contestable epistemic and normative assumptions-embodied values- algorithmic accountability as public reason-objections, limitations and challenges.	9
III	Real world of robots at war-autonomous weapon systems-robot warriors and crimes-human oversight for avoiding problem-responsibility for robot war crimes-robot warriors and child soldiers. Future of workplace automation-interaction of automation and employment.	9
IV	Moral agency and moral norms-moral turing test-Theoretical approaches: consequentialism- deontology-models of morality: Virtue approaches-associative learning-evolutionary approaches- role of emotions. Ethics of self driving cars: need for ethics settings-an applied trolley problem- empirical ethics.	9
V	Anthropomorphic bias: width of mind design space-Prediction and design-understanding the power of intelligence-capability and motive: Optimization processes-aiming at the target-friendly AI-technical failure and philosophical failure - rates of intelligence increase-hardware-threats and promises - AI vs Human Intelligence Enhancement. Ethical guidelines for AI-based public decision systems - Fair data usage policies - Transparency in algorithmic decisions - Citizen-centric AI governance. Case study: Social consequences of algorithmic discrimination.	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Matthew Liao	Ethics of Artificial Intelligence: An Introduction	1st Edition, Oxford University Press	2020
2	Paula Boddington	Artificial Intelligence Ethics	1st Edition, Cambridge University Press	2023
3	Mark Coeckelbergh	The Ethics of AI: Facts, Fictions, and Forecasts	1st Edition, MIT Press	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kate Crawford	Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence	Yale University Press	2021
2	Nick Bostrom	Superintelligence: Paths, Dangers, Strategies	Oxford University Press	2014

Course Designed by	Mrs.S.Saranya		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6S5			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	SEC IV: Computer Vision	Semester:	VI	
					Credits:	2	

Course Objective

- To understand the basic principles of image formation, image processing algorithms and recognition from single or multiple images (video).
- To emphasize the core vision tasks of scene understanding and recognition.
- To develop Applications to object recognition, image analysis, image retrieval and object tracking

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Learn fundamentals of computer vision and its applications	PO1,PO3,PO15,PSO1
CO2	Understand the basic image processing operations to enhance, segment the images.	PO2,PO6,PO15,PSO1
CO3	Understand the analyzing and extraction of relevant features of the concerned domain problem	PO1,PO3,PO5,PO6,PO15,PSO1
CO4	Analyze and apply the motion concepts and its relevance in real time applications	PO4,PO5,PO15,PSO1
CO5	Apply the knowledge in solving high level vision problems like object recognition, image classification	PO1-PO5,PO7,PO8,PO10,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	3	2	2	2	2	2	-	2	-	-	-	2	3	3	2
CO2	2	3	2	2	2	3	2	2	-	2	-	-	-	2	3	3	2
CO3	3	2	3	2	3	3	2	2	-	2	2	-	-	2	3	3	2
CO4	2	2	2	3	3	2	2	2	-	2	2	-	-	2	3	3	2
CO5	3	3	3	3	3	2	3	3	2	3	2	2	2	2	3	3	2

Unit	Course contents	Hours
I	Overview of computer vision and its applications: Image Formation and Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation	9
II	Image Processing: Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its applications in sharpening, blurring and noise removal	9
III	Feature detection: Edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations Segmentation: Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut	9
IV	Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models. Motion representation: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation	9
V	Motion tracking: statistical filtering; iterated estimation; observability and linear systems; the Kalman filter Object recognition and shape representation: alignment, appearance-based methods, invariants, image eigenspaces	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R. Szeliski,	Computer Vision: Algorithms and Applications	Springer, 2 nd edition	2022
2	D. A. Forsyth and J. Ponce	Computer Vision: A Modern Approach	Pearson Education, 2 nd edition	2011
3	V. K. Ayyadevara & Y. Reddy	Modern Computer Vision with PyTorch	Packt Publishing 2 nd edition	2024

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER S \ EDITION	YEAR OF PUBLICATION
1	Adrian Rosebrock	Deep Learning for Computer Vision with Python	PyImageSearch	2025
2	R. Schalkoff,	Pattern Recognition – Statistical, Structural and Neural Approaches	John Wiley	2007

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	26UAI6S6			Title	Batch:	2026-2029	
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	SEC IV: Recommender Systems	Semester:	VI	
					Credits:	2	

Course Objective

- To know the concept of recommender systems and machine learning algorithms used for prediction
- To get the knowledge of various algorithms to build recommendations based on contextual parameters
- To understand other related issues, such as evaluation methods, and implication of Recommender system on society

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Familiarize with recommender systems and their applications	PO1,PO15,PSO1
CO2	Analyze the different approaches towards recommendation	PO2,PO3,PO6,PO15,PSO1
CO3	Evaluate the effectiveness of recommender system	PO1,PO3,PO5,PO6,PO15,PSO1
CO4	Design recommender system	PO2,PO4,PO5,PO15,PSO1
CO5	Build an effective recommender system.	PO1- PO5,PO7,PO8,PO10,PO15,PSO1

Mapping

CO/ PSO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	2	2	2	2	2	2	2	-	2	-	-	-	2	3	3	2
CO2	2	3	3	2	2	3	2	2	-	2	-	-	-	2	3	3	2
CO3	3	2	3	2	3	3	2	2	-	2	2	-	-	2	3	3	2
CO4	2	3	2	3	3	2	2	2	-	2	2	-	-	2	3	3	2
CO5	3	3	3	3	3	2	3	3	2	3	2	2	2	2	3	3	2

Unit	Course contents	Hours
I	An Introduction to Recommender Systems: Goals of Recommender Systems, Basic Models of Recommender Systems, Domain-Specific Challenges in Recommender Systems, introduction to Advanced Topics and Applications	9
II	Collaborative Filtering: User-based nearest neighbour recommendation, Item-based nearest neighbour recommendation, Model based and pre-processing based approaches, Attacks on collaborative recommender systems	9
III	Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms	9
IV	Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders. Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.	9
V	Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centered metrics	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jannach D., Zanker M. and FelFering A.,	Recommender Systems: An Introduction,	Cambridge University Press 1st ed.	2011
2	Ricci F., Rokach L., Shapira D., Kantor B.P	Recommender Systems Handbook	Springer, 3rd ed.	2022
3	M. Roy, P. Kar, & S. Datta	Recommender Systems: A Multi-Disciplinary Approach	CRC Press / Routledge 1 st Edition	2024

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Zhe Wang, Chao Pu, & Felice Wang	Deep Learning Recommender Systems	Cambridge Univ. Press, 1 st edition	2024

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UAI6AL			Title	Batch:	2026 - 2029	
				ALC-II: Quantum Computing	Semester:	VI	
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem			Credits:	2	

Course Objective

- Learn key concepts such as superposition, entanglement, and quantum measurement.
- Study qubits, quantum gates, and quantum circuits.
- Analyze fundamental algorithms, including Shor's algorithm, Grover's search, and quantum Fourier transform.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	PO Mapping
CO1	Understand the basic principles of quantum mechanics that underpin quantum computing.	PO1,PO15,PSO1
CO2	Learn the differences between classical computing and quantum computing.	PO1-PO7,PSO1
CO3	Explore the historical development of quantum computing and its potential future applications.	PO1,PO3,PO8,PO15,PSO1
CO4	Gain an understanding of key quantum mechanics concepts such as superposition, entanglement, and interference.	PO1,PO8,PO15,PSO1
CO5	Learn about quantum states, quantum bits (qubits), and how they differ from classical bits.	PO1,PO5,PO8,PO15,PSO1

Mapping

CO/ PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
CO1	3	1	2	2	2	2	2	2	-	1	-	-	-	2	3	3	2
CO2	2	2	2	2	2	2	2	1	-	1	-	-	-	2	2	3	2
CO3	2	1	2	1	1	1	1	2	-	1	-	-	-	1	2	2	1
CO4	3	1	2	2	2	2	2	3	-	1	-	-	-	2	3	3	2
CO5	3	2	2	2	3	2	2	3	-	2	-	-	-	2	3	3	2

Units	Course Contents	Hrs
I	Introduction to Quantum Computing - What is Quantum Computing? - Difference Between Classical and Quantum Computers - Basic Concepts of Quantum Mechanics: Qubits vs. Classical Bits - Superposition and Entanglement (Simple Explanation) - Real-Life Examples of Quantum Effects - Case Study: Why Do We Need Quantum Computers?.	
II	Qubits and Quantum States: Understanding Qubits (Quantum Bits) - The Bloch Sphere (Basic Explanation) - Superposition: How a Qubit Can Be 0 and 1 at the Same Time - Quantum Measurement: How Qubits Collapse to 0 or 1 - Simple Demonstration: Simulating a Qubit Using Python (Optional).	
III	Basic Quantum Gates and Circuits: Introduction to Quantum Gates: NOT Gate (X Gate) - Hadamard Gate (H Gate) - CNOT Gate (Controlled NOT) - How Quantum Circuits Work - Simple Quantum Circuit Examples - Hands-On: Drawing a Quantum Circuit (Paper or Online Simulators).	
IV	Introduction to Quantum Algorithms: What is a Quantum Algorithm? - Simple Examples: Deutsch Algorithm (Basic Problem Solving) - Grover's Algorithm (Search Optimization) - How Quantum Computing Can Solve Problems Faster - Case Study: How Quantum Computing Can Help in Real Life.	
V	Applications and Future of Quantum Computing: How Quantum Computers Can Help in: Cryptography and Cybersecurity - Medicine and Drug Discovery - Artificial Intelligence (AI) - Solving Complex Scientific Problems - Challenges and Limitations of Quantum Computers - Future of Quantum Technology - Final Discussion: What's Next for Quantum Computing?.	
	Total	SS

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Rajkumar Buyya & Sukhpal Singh Gill (Eds.)	Quantum Computing: Principles and Paradigms"	Elsevier (Morgan Kaufmann), 1st Edition	2025
2	Prakash Kuppuswamy, Saeed Q. Al-Khalidi Al-Maliki, et al.	Quantum Computing: Beginner's Guide	New Delhi Publishers, 2025, 1st Edition	2025

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Chris Bernhardt	"Quantum Computing for Everyone"	The MIT Press	2024
2	Jack D. Hidary	Quantum Computing: An Applied Approach	Springer, 2 nd edition	2021

Course Designed by	Dr.S.Niraimathi		
Verified by HoD	Dr.S.Niraimathi		
Approved by Chairman Academic Council	Dr.R.Manickachezian		

ANNEXTURE III

1. GANDHIAN THOUGHTS
2. UZHAVU BHARATHAM
3. MANAIYIYAL MAHATHUVAM
4. VAC

VAC-I: Practical approach for Statistical problems using AI and Machine Learning

VAC-II: A Pratical Approach for Predictive Analytics in Skill Development